

THE KOREAN JOURNAL OF SECURITY AFFAIRS

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The Republics of Kazakhstan and Korea**

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Theoretical frameworks and evaluations**

Hyo Joon Chang



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Challenges and Opportunities Facing Middle-Power Nonproliferation Overachievers: The Republics of Kazakhstan and Korea

Richard Weitz

Abstract

This article analyzes how certain non-nuclear weapons states have become prominent contributors to the global nuclear nonproliferation regime despite their absence of such weapons. The first section of this manuscript defines the concept of middle powers and nonproliferation overachievers. The next part relates the achievements of the Republic of Kazakhstan in countering the vertical and horizontal spread of nuclear weapons, including eliminating the nuclear delivery systems Kazakhstan inherited from the Soviet Union and contributing to international efforts to prevent Iran and North Korea from achieving nuclear weapons. The third section compares the case of Kazakhstan to that of the Republic of Korea, which has also made major contributions in support of nuclear nonproliferation, especially regarding enhancing the security of nuclear materials. The next section reviews challenges facing each state's nonproliferation policies, including Russia's invasion of Ukraine and renewed great-power rivalries. The conclusion suggests possible joint nuclear nonproliferation initiatives for Kazakhstan and South Korea. It also analyzes the diverging and common drivers explaining the two countries' behavior, such as their alliance ties and nuclear histories.

The Republic of Kazakhstan is a world leader in opposing nuclear weapons while promoting the peaceful use of civilian nuclear power. Shortly after achieving independence in 1991, the newly independent government of Kazakhstan, led by President Nursultan Nazarbayev, took decisive measures to renounce and destroy the nuclear weapons that the Soviet Union left on its soil when it collapsed. Kazakhstan was subsequently able to accede to the Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty or NPT) as a non-nuclear weapons state. Since then, Kazakhstan has worked cooperatively with the International Atomic Energy Agency (IAEA) to fully implement the Agency's safeguards regarding the country's peaceful nuclear energy activities even as Kazakhstan has become a leading world supplier of uranium and expanded its national nuclear energy infrastructure, to support its own and other countries' energy needs. Kazakhstan has also collaborated with other partners to counter proliferation, employing diverse diplomatic measures to discourage Iran or North Korea from seeking nuclear weapons. Due to its horrific legacy as a nuclear weapons test site, Kazakhstan has also been a leading world force behind ending the testing of nuclear weapons. At the global level, Kazakhstan has promoted the universal adoption of the Comprehensive Test Ban Treaty (CTBT). Within Central Asia, Kazakhstan had a lead role in the adoption of the Central Asian Nuclear Weapons Free Zone (CANWFZ) and pursued several initiatives to constrain Iran's nuclear weapons potential.

Kazakhstan strongly supported the Nuclear Security Summits that occurred every other year between 2010 and 2018. Citing Kazakhstan's leadership on nuclear nonproliferation issues, Nazarbayev even proposed hosting such a summit itself.¹⁾ To advance global nuclear security, Kazakhstan has promoted the safe use of nuclear energy, stronger steps to secure radiological sources (which can be used to make radiological dispersal devices, aka "dirty bombs"), and enhancing the IAEA's role and authority in the areas of nuclear safety and security. More recently, Kazakhstan became the first country to establish a "nuclear fuel bank" for low-enriched uranium (LEU) in cooperation with the IAEA. Such a bank allows countries interested in pursuing civilian nuclear power to procure LEU fuel from an international supplier without having to develop their own fuel fabrication facilities, which are both costly and potentially able to manufacture fissile material for nuclear weapons. Throughout his years in office, Nazarbayev was also a prominent statesman calling upon the existing nuclear weapons states to undertake more rapid and comprehensive steps toward nuclear disarmament. Nazarbayev's successor as President, former Foreign and Prime Minister Kassym-Jomart Tokayev, has taken up this mantle and maintained Kazakhstan's status as a global nonproliferation overachiever, referencing the issue at this fall's UN

1) Nursultan Nazarbayev, "Nuclear Security Summit 2014," KazakhTV, March 25, 2014, http://kazakh-tv.kz/en/view/world_news/page_47448_.

General Assembly session and augmenting Kazakhstan's support for novel nonproliferation initiatives.

The organization of this article proceeds as follows. This section defines the concept of middle powers and nonproliferation overachievers. The second part reviews the achievements of Kazakhstan in countering the vertical and horizontal spread of nuclear weapons. These contributions include eliminating the nuclear arsenal Kazakhstan inherited from the Soviet Union and discouraging other countries from seeking nuclear weapons. The third section compares the Kazakhstan case to that of the Republic of Korea (ROK), which has also punched above its weight in the nuclear proliferation domain, especially regarding enhancing the security of nuclear materials. The next part reviews some challenges facing each state's nonproliferation policies. These include Russia's invasion of Ukraine, heightened great-power tensions, and other factors that have worsened the conditions for nuclear nonproliferation and disarmament. The conclusion suggests possible areas for joint nonproliferation initiatives between Kazakhstan and South Korea, such as measures to strengthen the security of nuclear facilities in potential war zones. It also analyzes the diverging and common drivers explaining the two countries' behavior, such as their alliance ties and nuclear histories.

The academic concept of "middle powers" draws insights from the realist, liberal and constructivist school of international relations since it embraces military, economic, and soft power issues along with status considerations and the national leadership's conception of their country's proper role in world affairs. These countries lie somewhere on a continuum between the primary "rule makers" of the international system and the regular "rule takers" that must maneuver as best they can according to the norms, laws, and rules decided by the great powers. In some areas, they can exploit their country's unique capabilities, perceived legitimacy, and other favorable variables to bend and even change some rules.²⁾ Some emerging scholars are profitably applying the concept to nuclear nonproliferation issues, noting the contributions of Brazil, Turkey, and South Korea and other influential non-nuclear-weapons states to curbing the spread of nuclear weapons. These analysts find that security, status, and domestic political factors have all, at times, contributed to the adoption of these policies as well as to these countries being able to achieve more substantial results than might be expected given their general attributes.³⁾ The continued diffusion of nuclear and other capabilities to additional countries beyond the traditional "P5" great powers

2) Detlef Nolte, "How to Compare Regional Powers: Analytical Concepts and Research Topics," *Review of International Studies*, vol. 36, no. 4 (2010), pp. 881-901.

3) Yeseul Woo, "The Role of 'Middle Powers' in Nuclear Security Crises," unpublished doctoral dissertation, Department of War Studies of King's College, London, United Kingdom, working draft.

of China, France, Russia, the United States, and the United Kingdom could also generate more “nonproliferation overachievers.” All five of these states both have nuclear weapons and permanent membership on the UN Security Council, with the right to veto proposed resolutions. In some cases, middle powers have played a great role in curbing the proliferation of weapons of mass destruction (WMD) despite their lack of nuclear weapons, permanent membership on the UN Security Council, or other military or diplomatic capabilities applicable to the nonproliferation area.

Kazakhstan’s Emergence as a Middle Power in the Nuclear Nonproliferation Realm

The Republic of Kazakhstan also fits nicely into this framework. Nursultan Nazarbayev, Kazakhstan’s founding post-Soviet president, elevated nuclear nonproliferation as a core element of his country’s foreign policy. Other domestic political actors, including the nation’s nuclear scientists and civic movements, embraced this priority. Kazakhstan has realized important gains through its nonproliferation “niche diplomacy.”⁴⁾ For instance, Kazakhstan elevated its international status through its nonproliferation commitments and contributions. In the words of the chair of the parliament’s committee on foreign affairs, defense, and security committee, Mukhtar Yerman, “Kazakhstan would not have the same level of respect it now enjoys in the international arena” had it not pursued its forward-leaning proliferation policies.⁵⁾ By renouncing its nuclear weapons options, moreover, Kazakhstan has eschewed the political isolation and economic sanctions that have burdened those countries that have pursued nuclear weapons capabilities, such as Iran and North Korea, which both violated numerous UN Security Council resolutions in seeking uranium enrichment and long-range ballistic missile capabilities.

4) Emmanuelle Maitre, “Kazakhstan’s nuclear policy: an efficient niche diplomacy?,” Fondation pour la Recherche Stratégique, July 1, 2018, <https://www.frstrategie.org/en/publications/notes/kazakhstans-nuclear-policy-efficient-niche-diplomacy-2018>.

5) Oksana Davydova, “First President Nazarbayev’s Legacy: Fearless Anti-Nuclear Weapons Pioneer,” *The Astana Times*, July 1, 2020, <https://astanatimes.com/2020/07/first-president-nazarbayevs-legacy-fearless-anti-nuclear-weapons-pioneer/>

During the Soviet era, the Communist Party of the Soviet Union ruthlessly exploited Kazakhstan's territory to advance its military-industrial complex. The most horrific dimension of this process was the use of Kazakhstan to house major elements of the Soviet Union's weapons of mass destruction complex, encompassing nuclear, chemical, and biological weapons. The Soviet power ministries exploited Kazakhstan's rich uranium deposits to fuel the Soviet civilian nuclear energy program as well as manufacture nuclear warheads. The Soviet military then deployed many of these warheads on long-range nuclear-armed missiles, many based in Kazakhstan, targeted at the United States and other countries. Most notoriously, the Soviets conducted hundreds of nuclear weapons detonations at the Semipalatinsk Nuclear Test Site (also known as the Polygon) in northeastern Kazakhstan. Many of these explosions generated radioactive fallout that contaminated huge areas of the country, leading to serious health problems for well over a million people.

Freed from the Soviet yoke, the Nazarbayev government swiftly took measures to eliminate this unwelcome legacy, which at the time included some 1,400 nuclear warheads on former Soviet intercontinental ballistic missiles and T-95M cruise-missile-carrying strategic bombers. This total would have amounted to the world's fourth-largest nuclear force if the government had decided to maintain the arsenal as a means of deterrence and defense. Within a few years, Kazakhstan either eliminated these nuclear warheads and strategic delivery systems or transferred components to the United States and the new Russian Federation, which unlike Kazakhstan, decided to sustain large nuclear forces. In exchange, Kazakhstan received security guarantees from the United States, the United Kingdom, and the Russian Federation regarding the independence and sovereignty and its borders, commitments to refrain from threats of military force and economic coercion, and pledges of consultations should questions arise concerning these assurances. Additionally, these three countries provided similar security guarantees to Ukraine, whose government also renounced its Soviet nuclear weapons inheritance, albeit more reluctantly and under tremendous U.S. and Russian pressure. In 1994, Kazakhstan acceded to the Treaty on the Reduction and Limitation of Strategic Offensive Arms (START I) and the NPT as a non-nuclear-weapons state.⁶⁾

Furthermore, on August 29, 1991, Nazarbayev issued a decree that closed the Semipalatinsk complex and banned the future testing of nuclear weapons on Kazakhstan's territory. The decree was supported by the country's large anti-nuclear testing movement, which formed alignments with other groups

6) Abira Kuandyk, "Kazakhstan Welcomes Treaty on Measures for Further Reduction and Limitation of Strategic Offensive Arms," *The Astana Times*, February 2, 2021, <https://astanatimes.com/2021/02/kazakhstan-welcomes-treaty-on-measures-for-further-reduction-and-limitation-of-strategic-offensive-arms/>.

exposed to nuclear weapons testing, such as the people of Nevada.⁷⁾ The General Assembly of the United Nations later designated August 29 as the worldwide International Day against Nuclear Tests. The IAEA, the United States, and the Russian Federation then executed a joint project to seal off the tunnels at Semipalatinsk and take other measures to secure its dangerous nuclear and radiological material. Meanwhile, the Kazakhstan authorities constructed a National Nuclear Center at the former Semipalatinsk (renamed Semey in 2007) site dedicated to the peaceful research of nuclear science, including environmental monitoring of the previous nuclear tests. Mirroring the country's multi-vector foreign policy, the national nuclear company, Kazatomprom, has sustained comprehensive commercial ties with entities in China, Europe, Russia, and the United States. In line with its commitment to making its nuclear energy power projects safe and secure, the government also signed a Comprehensive Safeguards Agreement with the IAEA, which came into force in 1994, and then acceded to the Agency's Additional Protocol, which entered into force in 2007. Through the Additional Protocol, IAEA monitors have the authority to cover a broader range of potential nuclear activities, including inspection rights at undeclared sites where unauthorized nuclear activities might be occurring.

Kazakhstan subsequently joined the world's major export control regimes, such as the Nuclear Suppliers Group, the Proliferation Security Initiative, the Global Initiative to Combat Nuclear Terrorism, the Global Partnership against the Spread of Weapons of Mass Destruction, and the Zangger (Nuclear Exporters) Committee. In 2008, the parliament ratified the International Convention for the Suppression of Acts of Nuclear Terrorism, which commits parties to undertake measures to prevent and punish efforts to utilize nuclear materials in terrorist acts. In support of UN Security Council Resolution 1540 (2004), Kazakhstan has taken steps to prevent non-state actors from developing, acquiring, manufacturing, possessing, transporting, transferring, or using nuclear, chemical, or biological weapons and their means of delivery. Kazakhstan has hosted conferences and undertaken other measures to diffuse knowledge about the adverse impacts of nuclear tests to promote the universal adoption of the Comprehensive Test Ban Treaty. To generate grassroots' support, Kazakhstani citizens organized an Internet-based project, "Abolish Testing – Our Mission" (ATOM) to empower any individual to sign a position calling on all governments to adopt the CTBT. In the United Nations and other arenas, Kazakhstani officials called for measures to bolster the authority and the role of the IAEA, adopt legally binding nuclear safety standards, increase the transparency of national nuclear activities, strengthen the negative security assurances provided the non-nuclear weapons states, establish uniform procedures for responding with alacrity to nuclear incidents accidents, and

7) Togzhan Kassenova, *Atomic Steppe: How Kazakhstan Gave Up the Bomb* (Stanford University Press, 2022).

accelerate long-term progress toward complete nuclear disarmament. At Astana's initiative, the UN General Assembly adopted the UN Universal Declaration on the Achievement of a Nuclear-Weapon-Free World.⁸⁾ In 2019, Nazarbayev further organized a Global Alliance of Leaders for Nuclear Security and Nuclear-Weapon-Free World. Due to these policies and his making nuclear issues a prominent theme in his many presentations before the United Nations and other international audiences, Nazarbayev made nonproliferation Kazakhstan's international "brand."⁹⁾

Kazakhstan's most innovative contribution to enhancing global nuclear nonproliferation is its hosting of the world's first international nuclear "fuel bank" under IAEA supervision. The facility, which began operating in 2017 after a decade of detailed preparations, offers uranium reactor fuel and various nuclear services to states pursuing peaceful nuclear energy programs, allowing them to avoid the economic, environmental, and diplomatic costs of making their nuclear fuel through an indigenous uranium enrichment cycle. In other words, the bank provides countries with reactor fuel in a safer, cheaper, and more secure manner than if they tried to develop their own fuel-producing technologies, which can be misused to make nuclear weapons. For example, North Korea notoriously misused IAEA assistance to develop the capacity to manufacture fissile material for nuclear warheads. A nuclear fuel bank relies on market incentives, rather than coercive methods, to encourage countries to lease nuclear fuel from designated provider states and then repatriate the resulting spent uranium fuel to the original supplier for reprocessing and disposal. Under its arrangement with the IAEA, Kazakhstan bears the costs for the bank's daily operations, while voluntary donations to the Agency cover the costs of the repository's equipment, uranium stockpiles, and related expenditures.¹⁰⁾ The international community supported Kazakhstan's proposal to host the bank given the country's extensive experience with nuclear technologies; its exemplary nonproliferation record, and its large uranium deposits and exports.

8) "Treaty on Prohibition of Nuclear Weapons as New Instrument in Nuclear Disarmament Process," *The Astana Times*, June 20, 2022, <https://astanatimes.com/2022/06/treaty-on-prohibition-of-nuclear-weapons-as-new-instrument-in-nuclear-disarmament-process/>.

9) Stephen J. Blank, "Nuclear non-proliferation's new challenge," *Stars and Stripes*, August 25, 2021, <https://www.stripes.com/opinion/2021-08-25/nuclear-non-proliferation-new-challenge-kazakhstan-2663811.html>.

10) Catherine Putz, "Kazakhstan Banks on Nuclear Power," *The Diplomat*, June 3, 2015, <http://thediplomat.com/2015/06/kazakhstan-banks-on-nuclear-power/>.

Nonproliferation Partnership with the United States

The United States was Kazakhstan's leading foreign partner in executing its initial nonproliferation activities, providing substantial funding and technical assistance. Much of the support provided flowed through the U.S. Nunn-Lugar Cooperative Threat Reduction program. The most prominent joint endeavor was "Project Sapphire," in which Kazakh-U.S. collaboration relocated over 500 kilograms of highly enriched uranium (HEU) from Kazakhstan's Ulba Metallurgical Plant to highly secure storage facilities at the Oak Ridge complex in the United States.¹¹⁾ Additional joint Kazak-U.S. projects have included "downblending" HEU in Kazakhstan into low-enriched uranium (LEU), which is much less suitable for making weapons.¹²⁾ Another line of action included enhancing barriers that impede the smuggling of nuclear and radiological materials through Kazakhstan's territory. The United States and other countries have helped the Kazakhstan government to strengthen its export controls, nuclear training and education activities, border and cyber security, and physical protection systems.

Collaborating at the highest levels, U.S. and Kazakhstani policymakers have regularly showcased Kazakhstan's utility as an exemplary non-proliferation actor whose policies and practices should be emulated by North Korea, Iran, and other states undertaking controversial nuclear programs. Kazakhstan's leaders shared this aspiration. At the time of the 2012 Nuclear Security Summit in Seoul, President Nazarbayev published an op-ed in *The New York Times* entitled, "What Iran Can Learn from Kazakhstan." Reminding readers of how Kazakhstan prospered after eliminating its nuclear weapons capabilities and committing to only the pursuit of only peaceful nuclear activities in close cooperation with the IAEA, Nazarbayev wrote that, "Kazakhstan has used its close diplomatic relations with our neighbor across the Caspian Sea to urge Tehran to learn from our example."¹³⁾ The following year, Kazakhstan played a prominent role in international efforts to keep Iran from pursuing nuclear weapons. Two rounds of talks involving the "P5+1" group (all five permanent UN Security Council members and Germany) negotiating with Iran took place in Almaty, Kazakhstan. The Iranian government had rejected proposals to meet in other locations but viewed Kazakhstan as an impartial host. Then-Secretary of State John Kerry and

11) John A. Tirpak, "Project Sapphire," *Air Force Magazine* (August 1995), <http://www.afa.org/magazine/Aug1995/0895sapphire.asp>.

12) "Kazakhstan and U.S. cooperate to eliminate highly enriched uranium in Kazakhstan," U.S. National Nuclear Security Administration, U.S. Department of Energy, September 22, 2020, <https://www.energy.gov/nnsa/articles/kazakhstan-and-us-cooperate-eliminate-highly-enriched-uranium-kazakhstan#.X2tmt3cqS6E.twitter>

13) Nursultan Nazarbayev, "What Iran Can Learn From Kazakhstan," *The New York Times*, March 25, 2012, <http://www.nytimes.com/2012/03/26/opinion/what-iran-can-learn-from-kazakhstan.html>.

other U.S. officials expressed gratitude for Kazakhstan's contribution to realizing the subsequent Iran nuclear deal, the Joint Comprehensive Plan of Action (JCPOA). When Jill Hruby, U.S. Administrator of the National Nuclear Security Administration, visited Kazakhstan in October 2022, she remarked that, "Kazakhstan has been an outstanding partner of the United States on nuclear security and nonproliferation for over 30 years."¹⁴ Her Deputy, Frank Rose, added that, "We feel strongly that now more than ever we must continue working together to make the region safer through our commitment to nuclear security and nonproliferation."¹⁵ Several U.S. members of Congress nominated Nazarbayev for a Nobel Prize for his contributions to nuclear peace and nonproliferation.¹⁶ Due to his strong, sustained, and influential nonproliferation stance, Nazarbayev received more opportunities to meet with U.S. presidents than his Central Asian counterpart. His outside influence also helped Kazakhstan win election to a seat as a non-permanent member of the UN Security Council in 2016. Nazarbayev used the opportunity to advance "Kazakhstan's Concept and Vision for Sustaining Global Partnerships for a Secure, Just and Prosperous World," whose first priority was "achieving a world free of nuclear weapons."¹⁷

Nonetheless, Kazakhstani leaders have called on the United States to ratify the CTBT, accept all the regional nuclear-free zones, and reduce its nuclear arsenal. More generally, Kazakhstani leaders have criticized the United States, the Russian Federation, and the other nuclear weapons states for their halting progress toward nuclear disarmament, for the flawed execution of their negative security assurances to countries like Ukraine and Kazakhstan that renounced their nuclear weapons options, and for sustaining an "unfair" NPT regime that treated some countries differently from others. Kazakhstan notably acceded to the Treaty on the Prohibition of Nuclear Weapons (TPNW) in 2019 despite P5 opposition. Unlike the NPT, the TPNW would impose an immediate and comprehensive ban on the research, development, manufacture, or possession of nuclear weapons. In partnership with their colleagues from Kiribati, where the United States and the United Kingdom had conducted dozens of nuclear tests, Kazakhstani diplomats successfully placed the issue of rendering assistance to people and places that suffered from nuclear testing on the agenda of the First Meeting of the TPNW States Parties in June 2022.¹⁸ They also have encouraged dialogue between states

14) "Top NNSA Leaders Visit Kazakhstan, Discuss Continued Security, Nuclear Nonproliferation Cooperation," National Nuclear Security Administration, U.S. Department of Energy, October 14, 2022, <https://www.energy.gov/nnsa/articles/top-nnsa-leaders-visit-kazakhstan-discuss-continued-security-nuclear-nonproliferation>.

15) *Ibid.*

16) "Two US Congressmen Think Kazakhstan's President Deserves a Nobel Peace Prize," Eurasianet, June 3, 2008, <https://eurasianet.org/two-us-congressmen-think-kazakhstans-president-deserves-a-nobel-peace-prize>.

17) Almasbek Zhumadilov, "Kazakhstan set to assume UNSC presidency Jan. 1," *The Astana Times*, December 31, 2017, <https://astanatimes.com/2017/12/kazakhstan-set-to-assume-uns-sec-presidency-jan-1/>.

holding diverging opinions on the treaty, including the P5 opponents. Though Kazakhstan was the first former Soviet republic to join the TPNW, its diplomats have since encouraged additional countries, especially the additional members of the CANWFZ, to join as well.¹⁹⁾

South Korea's Contributions

South Korea boasts strong credentials as an important contributor to the global nonproliferation regime. The ROK has joined the Nuclear Non-Proliferation Treaty as a non-nuclear-weapon state, ratified the Comprehensive Nuclear Test Bans Treaty, and adopted the IAEA Additional Protocol and other IAEA conventions. The ROK is also a member of the Nuclear Suppliers Group as well as the Zangger Committee. South Korea has partnered with Washington to promote the adoption of the IAEA Additional Protocol by importers of their nuclear technologies and services.²⁰⁾ At the ROK-based International Nuclear Nonproliferation Security Academy, experts from the U.S. National Nuclear Security Administration and the Korea Institute for Nuclear Nonproliferation and Control (KINAC) jointly train nuclear officials from many countries on nuclear security and nonproliferation best practices. This continuing ROK support for policies, treaties, and doctrines that support nonproliferation, disarmament, no first use, and no testing of nuclear weapons, along with the exclusively peaceful use of nuclear technology under strong international safeguard, helps shore up the many nuclear nonproliferation regimes under strain.

ROK support for nuclear security—denying terrorists and other non-state actors access to nuclear materials, technologies, and experts—was most prominent in 2012. After Moscow proved unable to host that year's second Nuclear Security Summit, South Korean leaders, recognizing the importance of sustaining leadership attention and momentum in countering potential nuclear terrorism, arranged to host the session in Seoul. President Lee Myung-bak said that winning the competition to host this high-prestige event was a “diplomatic breakthrough”

18) “Treaty on Prohibition of Nuclear Weapons as New Instrument in Nuclear Disarmament Process,” *The Astana Times*, June 20, 2022, <https://astanatimes.com/2022/06/treaty-on-prohibition-of-nuclearweapons-as-new-instrument-in-nuclear-disarmament-process/>.

19) Kazakhstan called on CANWFZ States Parties to join the Treaty on the Prohibition of Nuclear Weapons,” Government of Kazakhstan, April 2, 2022, <https://www.gov.kz/memleket/entities/mfa/press/news/details/322068?lang=en>

20) Carol A. Clark, “NNSA’s Hruby Visits South Korea To Discuss National Security, Nonproliferation, And Nuclear Security Issues,” U.S. National Nuclear Security Administration, U.S. Department of Energy, August 15, 2020, <https://ladailypost.com/nnsas-hruby-visits-south-korea-to-discuss-national-security-nonproliferation-and-nuclear-security-issues/>.

in raising South Korea's international profile.²¹⁾ The ROK's effective leadership of the summit process also underscored its reputation as a major civilian nuclear energy player committed to strong safety and security standards for its nuclear-related exports. In taking up the baton, the ROK also helped fortify Asian support for enhancing global nuclear security, which before then had been primarily a U.S. initiative and transatlantic focus. Seoul also initiated the practice of hosting concurrent conferences of NGO experts and of nuclear industry executives. At the Seoul summit, the participating leaders from 53 countries and four international organizations both deepened and expanded the commitments they made at the inaugural 2010 summit. Through such innovative tools as issuing multinational "gift baskets," the participants made further progress in decreasing the use of HEU and plutonium, both potential fissile materials, securing radiological sources, elevating cyber and information security, and integrating nuclear safety and security.²²⁾

The focus of South Korea's nuclear diplomacy has been securing the nuclear disarmament of the Democratic People's Republic of Korea (DPRK, commonly referred to as "North Korea"). Past diplomatic deals involving North Korea, such as the 1994 Agreed Framework that froze the DPRK's nuclear activities and the 2005 Six Party accord that established an agreed path towards de-nuclearizing the Korean Peninsula, have failed to halt the DPRK's programs for any significant period. Although the parties have signed several interim agreements, they either were never implemented or later unraveled. Neither diplomacy, nor sanctions, nor military countermeasures have reversed North Korea's nuclear weapons program for any length of time. In 2022, North Korea test launched more nuclear-capable missiles than in any previous year. Pyongyang gives no indication that the DPRK will ever relinquish its nuclear weapons potential.

Challenges

South Korea and Kazakhstan face additional challenges as they seek to decrease global nuclear threats. The Russian invasion of Ukraine, while highlighting Kazakhstan's value as a nuclear nonproliferation leader, has exposed the country to sanctions and countersanctions imposed by Western countries and the Russian government upon each other. The conflict has elevated risks for regional investment, raised prices for many goods, seen tens of thousands of Russians flee to Kazakhstan, and impeded the transit of Kazakhstan's oil and other

21) Na Jeong-ju, "Korea to Host Nuclear Security Summit in 2012," *The Korea Times*, April 13, 2010, https://www.koreatimes.co.kr/www/nation/2022/03/113_64160.html.

22) Kelsey Davenport, "States Make Nuclear Security Pledges," *Arms Control Today* (April 2012), https://www.armscontrol.org/act/2012_04/States_Make_New_Nuclear_Security_Pledges.

goods through Russian territory or Russian-controlled pipelines and oil terminals. Additionally, the war has intensified concerns about Russian territorial aspirations regarding Kazakhstan. Not only does Kazakhstan have many ethnic Russians, but President Vladimir Putin and other Russian leaders have made comments contesting Kazakhstan's historical claims to independent statehood. Tokayev boldly refused to recognize the independence of the Ukrainian regions of Donetsk and Lugansk or Moscow's subsequent annexation of Ukrainian territory, despite Russian pressure to do so.²³⁾

South Korea has also faced increased great power coercion. A few years ago, the Chinese government applied a full-court press of diplomatic threats and sanctions to deter South Korea from deploying the U.S. Terminal High Altitude Area Defense (THAAD) ballistic missile defense system (BMD). The PRC organized consumer boycotts of ROK products, limited tourist and cultural exchanges with South Korea, and increased paramilitary incursions into South Korean waters. The Chinese pressure contributed to delays in installing the THAAD system. ROK diplomats also reached an informal "Three Nos" understanding with their PRC counterparts that suspended the deployment of additional THAAD batteries, operated the THAAD system in South Korea independently from other U.S. BMD assets, and declined to pursue a trilateral alliance with Japan regarding missile defense. Despite Chinese objections, the newly elected ROK administration under President Yoon Suk-yeol is now revisiting these limits.²⁴⁾ Meanwhile, as Russian-U.S. relations have deteriorated, Moscow's interest in maintaining the DPRK regime as a strategic buffer and security challenge for the United States has grown, while Russian willingness to apply international sanctions on North Korea has decreased. According to the U.S. government, Russia is also seeking munitions and other military support from the DPRK for its war in Ukraine.²⁵⁾ Despite North Korea's unprecedented wave of missile launches and other violations of UN Security Council resolutions originally adopted by Beijing and Moscow, the Chinese and Russian governments have blocked recent efforts to impose new sanctions on North Korea to punish and coerce Pyongyang to end its provocative policies. Instead, they have tried to exploit the crisis to constrain ROK-U.S. military cooperation, challenging the extended nuclear deterrence policies of the United States and South Korea.

Furthermore, Russia's aggression against Ukraine has decreased opportunities

23) Robyn Dixon, "Setbacks in Ukraine war diminish Russia's clout with regional allies," *The Washington Post*, November 30, 2022, <https://www.washingtonpost.com/world/2022/11/30/russia-kazakhstan-regional-neighbors-ukraine/>.

24) Jo He-rim, "China demands Korea uphold 'Three Nos' policy," *The Korea Herald*, July 28, 2022, <https://www.koreaherald.com/view.php?ud=20220728000666>.

25) Yonhap, "Russia continues to look to N. Korea for weapons for use in Ukraine: State Dept.," *The Korea Herald*, December 8, 2022, <https://www.koreaherald.com/view.php?ud=20221208000072>.

for nuclear arms control and increased potential incentives for states not possessing nuclear weapons to do so. The view has grown that Ukraine's abandonment of its nuclear weapons options in return for worthless international security assurances was a bad bargain. For example, analysts believe that the Ukraine experience will make the North Korean leadership even less willing to abandon its nuclear weapons program.²⁶⁾ Russia's multiple violations of the 1994 Budapest Memorandum have eroded confidence in the negative and positive security assurances the nuclear weapons states make to other countries as nonproliferation tools. In general, the NTP-recognized Nuclear Weapons States give negative security assurances to not use or threaten to use nuclear weapons against countries that do not possess them and that comply with their nuclear nonproliferation obligations. Kazakhstani officials have cited the Ukraine crises to demand clarification of the nature and extent of these assurances as well as measures to strengthen them.

By making so many nuclear threats, Russian officials have also underscored the potential advantages of having nuclear weapons. Fears of provoking Russian nuclear escalation has constrained the types of military support NATO governments have been willing to provide Ukraine. For instance, they have declined to establish a no-fly zone over Ukraine or supply long-range strike systems that would allow the Ukrainians to strike deep into Russian territory. Even before the war, the international nuclear nonproliferation regime constructed during the Cold War has been under strain due to renewed great-power competition, the proliferation of nuclear weapons and missile technologies to additional states, and the enhancement of non-nuclear means of attack (such as cyber weapons). As a result, the arms control regimes of the Cold War, which limited only two countries and one type of strategic weaponry (nuclear-armed missiles), have declined in value.

Even South Koreans have felt the pull of nuclear weapons options, including NATO-style "nuclear-sharing" arrangements.²⁷⁾ The credibility of U.S. security guarantees to defend South Korea with the use of nuclear weapons was weakening even before Russia's invasion of Ukraine due to the growth of DPRK nuclear capabilities; U.S. military setbacks in Afghanistan and other countries; statements by U.S. leaders such as former President Donald Trump casting doubts on the durability of U.S. force deployments; the U.S. abandoning of previous "red lines" against WMD activities in Syria, Iran, and elsewhere; and rising support among

26) Jeongmin Kim, "DPRK unlikely to denuclearize after war in Ukraine: Ex-ROK ambassador to Kyiv," Nk News, March 4, 2022, <https://www.nknews.org/2022/03/dprk-unlikely-to-denuclearize-after-war-in-ukraine-ex-rok-ambassador-to-kyiv/>.

27) Jennifer Ahn, "The Evolution of South Korea's Nuclear Weapons Policy Debate," Council on Foreign Relations, August 16, 2022, <https://www.cfr.org/blog/evolution-south-koreas-nuclear-weapons-policy-debate/>.

some Americans on behalf of a no-first use or sole purpose declaratory policy that could imply the United States would not use nuclear weapons in response to a DPRK biological, chemical, cyber, or large-scale conventional attack against South Korea. In response, prominent ROK national security leaders have raised the issue of returning U.S. non-strategic nuclear weapons to South Korea or for the ROK to acquire its own nuclear weapons, which could also give the DPRK more incentives to negotiate mutual military reductions with the South. However, seeking nuclear weapons could antagonize the United States and other countries, expose South Koreans to economic sanctions, weaken the ROK's high international reputation, legitimize the DPRK's keeping its own nuclear weapons, and deepen first-strike incentives between North and South Korea in a crisis.²⁸⁾

When Presidents Joe Biden visited Seoul in May 2022, he and President Yoon reaffirmed their commitment to “the complete denuclearization of the Korean Peninsula.” They also noted the U.S. commitment to deploy strategic military assets to the Peninsula “in a timely and coordinated manner...and identify new or additional steps to reinforce deterrence in the face of DPRK destabilizing activities.” The joint presidential statement further restated the U.S. commitment to employ “the full range of U.S. defense capabilities, including nuclear, conventional, and missile defense capabilities,” to protect South Korea.²⁹⁾ The Biden and Yoon administrations also resurrected the ROK-U.S. Extended Deterrence Strategy and Consultation Group. This mechanism is the main senior-level political-military consultative structure through which the two governments discuss how the Pentagon might use strategic weapons to deter a DPRK assault on the ROK. Through the Group, experts from both countries can jointly appraise potential U.S. extended deterrence packages to respond to various DPRK threats. At the September 16, 2022, high-level meeting, “The United States reiterated its ironclad and unwavering commitment to draw on the full range of its military capabilities, including nuclear, conventional, missile defense, and other advanced non-nuclear capabilities, to provide extended deterrence for the ROK.”³⁰⁾

28) Bruce Klingner, “Now is not the time for South Korea to go nuclear,” *The Washington Times*, August 2, 2022, <https://www.washingtontimes.com/news/2022/aug/2/now-is-not-the-time-for-south-korea-to-go-nuclear/>.

29) “United States-Republic of Korea Leaders’ Joint Statement,” The White House, May 21, 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/21/united-states-republic-of-korea-leaders-joint-statement/>.

30) “Joint Statement on the Extended Deterrence Strategy and Consultation Group Meeting,” U.S. Department of Defense, September 16, 2022, <https://www.defense.gov/News/Releases/Release/Article/3161720/joint-statement-on-the-extended-deterrence-strategy-and-consultation-group-meet/>.

Concluding Observations

Though South Korean governments continue to eschew nuclear weapons, a recurring source of tension with the United States is the ROK interest in reprocessing plutonium to support the expanded use of nuclear power domestically, make their nuclear exports more competitive, and decrease the volume of plutonium stored in waste depositories. U.S. officials have resisted the spread of reprocessing technologies due to their proliferation risks. In return for receiving U.S. nuclear technologies, reactor fuel, and other support when the ROK launched its nuclear power program, South Korea committed not to reprocess plutonium, enrich uranium, or transfer nuclear products made from any U.S.-supplied nuclear material or technologies to a third party without Washington's advanced consent. One solution might be for South Korea to follow Kazakhstan's example and undertake plutonium reprocessing within the framework of an IAEA-supervised multinational nuclear fuel bank.

Kazakhstan and South Korea could also launch joint, or mutually reinforcing, initiatives to strengthen nuclear security, such as relaunching the summits or other high-level gatherings to focus on nuclear security challenges and solutions. The end of the nuclear security summits has removed a major driver of multinational cooperation against nuclear terrorism. The world still lacks binding global standards and accountability for nuclear security. Given the tensions among the great powers, Kazakhstan and South Korea could have a pivotal role in driving progress in this area. The two countries' growing nuclear energy use and export ambitions give them an enormous stake in the security and safety of international nuclear commerce, which would suffer from a major nuclear terrorist incident anywhere.

Similarly, Kazakhstan and South Korea could promote initiatives to enhance the security of nuclear facilities in wartime, a threat highlighted by the Russia-Ukraine war, during which major fighting has transpired near several operating nuclear power stations. Ukraine's reactors have been designed to avoid a Chernobyl-style accident and thwart insider sabotage or external terrorist assaults, but the possibility that they might come under regular attack from invading Russian forces was never considered. This situation has presented a recurring challenge to the IAEA.³¹⁾ Both Kazakhstan and South Korea have successfully transitioned from recipient countries of nuclear nonproliferation assistance to net contributors to countering nuclear weapons proliferation and other nuclear threats. As their role in the world's nuclear energy markets continues to increase, so will their ability to influence global nuclear security.

31) "Update 81– IAEA Director General Statement on Situation in Ukraine," International Atomic Energy Agency, June 12, 2022, <https://reliefweb.int/report/ukraine/update-81-iaea-director-general-statement-situation-ukraine-12-june-2022>.

The nuclear nonproliferation policies and achievements of Kazakhstan and South Korea naturally differ due to certain unique circumstances. Though formally allied to Russia through the Collective Security Treaty Organization, Kazakhstan's government under Presidents Nazarbayev and Tokayev have pursued a "multi-vector" foreign policy that strives to maintain good ties with the United States and other Western countries, as well as China. In contrast, South Korea is not only a formal ally of the United States, but it hosts tens of thousands of U.S. soldiers and depends on U.S. extended deterrence guarantees, whereby the United States pledges to employ all possible means, including nuclear weapons, to defend South Korea from external threats. Second, Kazakhstan's prioritizing the ending of nuclear weapons testing reflects the country's horrific experience as a Soviet nuclear weapons testbed. In his speech before the UN General Assembly this September, President Tokayev observed that, having "suffered terribly from past nuclear weapons testing, ... we understand very clearly the dangers of escalating tensions between nuclear powers. For this reason, nuclear disarmament has become a key part of Kazakh foreign policy and we will be continuously struggling for a world free of nuclear arsenals."³²) In contrast, South Korea became a leader of the nuclear security summit process primarily due to some unique historical and personal circumstances at the time. Third, in recent years South Korean leaders have refocused their attention on keeping North Korea a non-nuclear weapons state, while Kazakhstan's leaders, not facing such an imminent and immense nuclear threat, have maintained a broader nuclear nonproliferation agenda.

Still, several common factors explain why Kazakhstan and South Korea have become prominent leaders of the nuclear nonproliferation order. First, both countries have extensive experience with the negative impact of nuclear weapons. The Kazakhstani people suffered from the Soviet Union's exploitation of Kazakhstan's territory to detonate hundreds of nuclear weapons tests, inflicting horrific human and environmental damage. South Koreans have had to live in a country surrounded by nuclear weapons possessor states and nuclear weapons aspirants. In particular, the northern neighbor has conducted half a dozen menacing nuclear tests. Strong leadership by Nazarbayev and several South Korean presidents helped channel this national experience into global nonproliferation leadership.

Second, Kazakhstan and South Korea have developed a major stake in the peaceful use of nuclear energy due to their expanding role in supporting civilian nuclear energy programs. Kazakhstan has become the world's largest producer and exporter of natural uranium, while South Korea's commercial nuclear power

32) "Kazakhstan to continue struggling for nuclear-weapon-free world – President," Kazinform, September 21, 2022, https://www.inform.kz/en/kazakhstan-to-continue-struggling-for-nuclear-weapon-free-world-president_a3981470.

industry has carved out a leading role in the global nuclear energy market. Both states strive to ensure that the world sees nuclear energy as a safe and secure source of low-carbon energy as well as reassure others that they are responsible suppliers of nuclear products and services.

Third, their nuclear nonproliferation and disarmament achievements have become prominent means of raising their international status and influence, allowing them to hit above their weight in this area despite their middle power rank, as well as benefit economically. Both countries have secured election as non-permanent members of the UN Security Council and additional leadership roles in other international institutions. Importantly, they have both avoided the economic sanctions and political isolation of Iran, North Korea, and other middle powers whose prosperity and prestige have suffered from their leaders' unreasonable nuclear ambitions. Experts from Kazakhstan and South Korea (and other countries) have noted the value of applying both countries' rich experiences in renouncing nuclear weapons options to Iran, North Korea, and other proliferation problem states.³³⁾

Finally, the great powers have generally welcomed their contributions. None of the P5 want Kazakhstan or South Korea to have nuclear weapons, while many of them have welcomed Astana's and Seoul's help in addressing proliferation problems ranging from the nuclear programs of North Korea and Iran to the growing gap between these states that have nuclear weapons and the demands of other countries critical of their slow pace of disarmament. The United States has provided important nonproliferation assistance to both countries—though the support has differed in each case, highlighting the importance of Washington's maintaining a diverse portfolio of nonproliferation support programs that can be optimally deployed depending on the recipient's specific conditions. The P5 should continue to encourage these nonproliferation overachievers at a time when their contributions have become even more vital.

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33) Kim Bo-gyung, "Experts from Korea, Kazakhstan shed light on denuclearization," *The Korea Herald*, September 30, 2019, <http://www.koreaherald.com/view.php?ud=20190930000892>.

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Measures to Strengthen Space Cooperation among South Korea, the U.S., and Japan

Geunho Song

Abstract

This thesis is a study on the ROK-US-Japan space cooperation plan to solve the security crisis on the Korean Peninsula caused by the increase in China's space threat and North Korea's ICBM launches. South Korea, the U.S., and Japan's space activities cooperation began with cooperation for the development of pure space science and technology in the past and is developing into space security areas such as joint space exploration cooperation, response to space threats, and strengthening defense space capabilities. By revitalizing the space cooperation organization between South Korea, the United States, and Japan, it will be possible to cope proactively with space threats from neighboring countries. The strengthening of space cooperation between South Korea, the United States, and Japan will advance the security of the Korean Peninsula and the development of space science and technology between South Korea, the United States, and Japan.

Keywords: *Space cooperation, Space technology, New space era, Artemis Program, NASA, KARI, JAXA*

I. Introduction

After the 2021 South Korea-US summit, South Korea participates in the Artemis program.¹⁾ The cooperation in the space sector between the two countries is expected to be strengthened due to participation in the Artemis program, removal of the ROK-US missile guidelines, and collaboration in satellite navigation stated in the joint statement between the ROK and the US.²⁾ There will be more opportunities for South Korea to participate in various space activities projects with advanced space activities countries.

According to a recent report by Morgan Stanley, the global satellite industry grew 1.6 times over the past ten years – from \$167 billion in 2010 to \$271 billion in 2019. It is expected to continue to grow to more than \$1 trillion. In 2040, 50% of the growth in the space industry will be in the satellite high-speed internet sector. The demand for data use of autonomous vehicles, the Internet of Things, artificial intelligence, and virtual reality will increase exponentially, and launch vehicle costs will be reduced thanks to the recycling of satellite launch vehicles and the mass production of satellites. As a result, the space industry will grow significantly.³⁾ Compared to the automobile industry, the space industry has 1.7 times the added value and 2.5 times the ratio of R&D personnel, which can create many jobs. The average development period in the space sector is ten years, which is advantageous compared to other industries such as the shipbuilding and automobile industries whose average development period are five years and three years, respectively.⁴⁾

The Space Internet communication and video service business has been developing significantly because launch costs are reduced thanks to the recycling of Space X's rocket and the development of micro-satellite technology. South Korea's high-speed Internet technology and image data analysis technology utilizing artificial intelligence will potentially help grow its space industry significantly in the global market. However, South Korea's space activities budget is about 700 million dollars, which is 0.04% of the gross domestic product. The Korea Aerospace Research Institute (KARI), an institution specializing in space activities, also is allocated a budget of about 500 million dollars and the size of the manpower is about 1,000 people.⁵⁾

In the past, space competition stemming from military confrontation between the US and the Soviet Union during the Cold War greatly affected space activities. Space

1) The Artemis program is the first US-led lunar exploration program 50 years after the U.S. Apollo program in 1970. It is a cooperative space program of commercial and international partners to send astronauts to the moon by 2024 and build a manned space base by 2028.

2) Kim Hyun-wook 2021, p. 7.

3) Morgan Stanley 2020.

4) Park Jeong-il, 2021.

5) The Federation of Korean Industries, 2021.

is not only vital for military and national security but also has significant implications for economic and industrial development. The space sector is a national core industry with high added value at a high technological level that will lead to large production and have technological ripple effects. The space industry has also passed the era of state-led space activities; the space industry has entered the new space era characterized by the 4th industrial revolution, artificial intelligence (AI), and big data. Public-private partnerships in the space industry are increasing as private sectors' participation and competitiveness in space activities grow and space technology innovation capabilities are enhanced.⁶⁾

So far, research on space activities has focused on strengthening South Korea's space activities capabilities to respond to space competition in Northeast Asia and analyzing space threats from neighboring countries. Cho's 2016 study looks into the expansion of the space industry and the promotion of strengthening the capabilities of the space industry. He analyzed the arms race in space in Northeast Asia. Some studies focus on South Korea's space launch vehicle development, expansion of space exploration activities, and enhancement of space industry capabilities through space cooperation.⁷⁾ Hwang Jin-young examined major US space security-related policies and explained the president's leadership on space activities, space policy, and South Korea-US missile guidelines, emphasizing the importance of collaborative space activities between Seoul and Washington.⁸⁾ Kim Jong-beom argued for the improvement of Korea's national space capabilities by strengthening international space cooperation while explaining the civilian-military nature of space technology.⁹⁾ These studies suggest that international cooperation serves as a vehicle for enhancing Korea's space power. However, there is a need for an in-depth study on key areas and ways to strengthen cooperation after the signing of the South Korea-U.S. Artemis Accords and removal of the ROK-U.S. missile guidelines during North Korea's imminent seventh nuclear test and continuous ICBM provocations.

South Korea continues to develop and exchange space technologies such as ISS science experiments with NASA and JAXA (Japan Aerospace Exploration Agency), while the U.S. - ROK Defense Ministry and the Air Force continue to conduct space cooperation and share space surveillance information, but South Korea is not capable of responding to space threats from North Korea and its neighbors.

After the ROK-US summit in 2021, the ROK-US missile guideline was lifted, and the United States invited South Korea into the lunar exploration program. If Korea, the United States, and Japan fail to respond quickly and strengthen space cooperation now, it will be difficult to establish active response capabilities against

6) Ahn Hyun-Jun, 2021, p. 8.

7) Cho Seong-ryeol, 2016.

8) Hwang Jin-young, 2018.

9) Kim Jong-beom, 2020.

space threats from North Korea and neighboring countries in near future and they will miss important opportunities for South Korea's space science and technological development.

This study aims to propose the tasks needed to facilitate space cooperation between South Korea, the United States, and Japan and to find out the issues of space activities cooperation and ways to strengthen their cooperation. It is imperative that the three countries establish a strategy to respond to the growing space threats and space militarization undertaken by China, Russia, and North Korea while utilizing and supplementing the strengths and weaknesses of the space activities capabilities of the three countries.

II. The international trend of space activities

1. Concept and Purpose of Space activities

Space activities can be defined as all activities related to space use and exploration by securing space technology through research and development on the production and launch activities of space objects such as satellites and space launch vehicles.¹⁰⁾ The U.S. National Aeronautics and Space Administration (NASA) established the term Aeronautics and Space Activity, first addressing and studying the problems of flight in and out of the Earth's atmosphere, secondly developing, testing, and operating aviation and spacecraft, and thirdly other space activities necessary for space exploration.¹¹⁾

Advanced space powers continue to invest in space activities and develop advanced technologies. Space power contributes to national economic power and industrial technology. The success of space activities can boost people's pride in their country and provide convenience in people's lives with information generated by satellite. In addition, space forces judge enemy military threats based on information collected from various sources in space and support the preparation of military operational plans.¹²⁾

The purpose of space activities can be classified into three categories: hard power, soft power, and social infrastructure. Hard power means military use of space. The launch of satellites and manned spacecraft enhances soft power by enhancing the excellence of the state and regime's advanced science and technology and national status. Lastly, space power for GPS services such as navigation, satellite communication supported by global communication, and disaster response helps establish social infrastructure.¹³⁾ All three types of international relations are

10) Ministry of Science and ICT and Korea Research Foundation, 2020, p. 35.

11) NASA, 1958.

12) Lee Seong-man and Kang Chang-bu, 2015, pp. 397-398.

observed in the space domain: conflict, competition, and cooperation. The Cold War-era and the current U.S.-China space race highlight the importance of international cooperation in building a big-budget space system and implementing space programs.

2. The history of space activities

The first period of space activities was between 1958 and 1972, when the Soviet Union launched the first Sputnik 1 satellite on October 4, 1957, leading to the development of military satellites and the development of the space industry for the Apollo manned spacecraft program. Between 1973 and 1986, the first space station and space shuttle were developed, the civilian use of space technology such as GPS increased, and new space activities in countries such as China, Japan, and Europe emerged. The third period led to the operation of the second-generation space station and the expansion of civilian space technology. The fourth period increased the use of digital technology and diversified international space program cooperation between 2003 and 2018. The fifth phase is expected to increase market products using signals and data from 2019 to 2033, build third-generation space stations, facilitate space exploration, and implement new manned space programs.¹⁴⁾ Currently, the Moon and Mars exploration programs of India, China, and the United States are underway, and active space activities are proceeding, including global satellite Internet network construction projects, satellite data sharing, and international cooperation on climate change.

3. Scope and Object of Space activities

To study space cooperation among South Korea, the United States, and Japan, we should be aware that space technology, and space system development capabilities are very important for private-led space activities in the New Space era. In addition, the demand for space exploration to secure resources and study the space environment is increasing, and space operational capabilities for the safe protection and operation of space assets are becoming essential for space activities. This study aims to evaluate South Korea, U.S., and Japan space activities and analyze South Korea's cooperation with the United States and Japan in developing space systems such as space technology, satellites, and space launch vehicles, furthering space exploration and space environment research, and strengthening space operations and military security. First, space technology development has a great economic ripple effect, and many technologies provide convenience to private life through space technology development. For example, LASIK surgery using laser technology, solar cells, water purifiers, fire protection devices, MRIs, and air purifiers are products

13) Kazuto Suzuki 2013, pp. 24-34.

14) Kim Jong-beom 2020, p. 7; OECD, 2016.

using space technology. The development of advanced space technologies such as satellite communication and navigation services can help develop the space industry in South Korea, the United States, and Japan. The development of satellites and space launch vehicles includes satellite production and satellite operation in space, rocket propulsion systems for space launch vehicles, precision guidance capabilities, and launch services. Second, space exploration and space environment research will share scientific data on the moon, Mars, and solar weather, and third, space surveillance and military security will protect the enemy's attacks on satellites and space assets, support intelligence, and maintain control of the land, sea, and air forces. The scope and targets of space activities cooperation between South Korea, the United States, and Japan are as follows.

<Table 1> Scope and targets of space activities cooperation between ROK, the United States and Japan

Category	The field of space cooperation	Details
South Korea-U.S.-Japan space cooperation	Space technology and space system development	satellite communications and navigation services, Commercial Space Activities and Space Transport Services
	Space Exploration and International Space Station	Astronomical exploration and resource development activities such as the moon and Mars, and participation in the ISS.
	Space Operations and Military Security	Space control, including space surveillance, space defense and attack, and space weapons development

III. ROK-U.S.-Japan Space Policy

1. U.S. Space Policy and Space Power

(1) U.S. Space Policy

The United States is leading the military and commercial use of space. After the establishment of NASA in 1958, the United States participated in the space race with the Soviet Union. Since then, it has implemented space policies with the Apollo manned spacecraft launch plan, the Strategic Defense Initiative, and the creation of the Space Command.¹⁵⁾ After the Apollo success, NASA planned to build the space station by 1975 to strengthen space exploration and built and operated a reusable 1981 space shuttle to move the station and save money. Due to the space shuttle

15) Jeong Heonju, 2021, p. 24.

accident and the high cost of developing the shuttle, Atlantis' last flight in 2011 ended its 30-year history.

In 2021, the Biden administration announced that it would continue to operate the National Space Council, a U.S. space policy group, which was re-operated by the Trump administration in 2017. The Biden administration's space policy is currently under development. In the Trump administration, Trump organized a space committee to resolve space activities conflicts between ministries in line with the U.S. priority policy and appointed Vice President Pence as chairman to promote U.S. space policy.

The National Space Policy announced by the U.S. president at the White House provides general information about the U.S. space policy. When Obama announced the national space policy in 2010, he suggested revitalizing the space industry, expanding international cooperation, and guaranteeing space security.¹⁶⁾ In the U.S. National Space Strategy released in 2018, President Trump emphasized that the U.S. national interests are the most important areas of war and argued that the United States should build its dominance in space.¹⁷⁾ It also emphasized international cooperation to strengthen the U.S. space military power in space and secure U.S. economic interests.¹⁸⁾ The U.S. space policy can be evaluated based on whether or not it ensures the advancement of national interests while maintaining and strengthening space dominance, expanding the commercial interest of space, and suppressing space threats from rival countries through space cooperation with allies. President Trump established the U.S. Space Command in 2019 as a separate, independent military unit that would respond to major threats attacking and interfering with U.S. space assets and strengthen space military power to ensure the smooth use of space. The U.S. Air Force had been responsible for space and cyberspace, but with the creation of the Space Force, the United States reaffirmed that space was an important area of security in the 21st century. Through the space policy guidelines, the Trump administration emphasized the continued development of space exploration programs through cooperation in the space sector with private companies and other countries.¹⁹⁾

(2) The US Space Strategy and Space Power

The end of the Cold War weakened the U.S.-Soviet space competition. However, the development of advanced weapons and satellite communication further strengthened the development of space for military purposes.²⁰⁾ After the 1991 Gulf

16) Hwang Jin-young and Lee Jun, 2021, p. 4.

17) Park Byung-kwang 2020, p. 4.

18) Yoo Jun-gu 2018, p. 1.

19) Kim Jong-beom 2020, p. 73.

20) Suzuki 2013, p. 83.

War, the United States implemented military operations with the support of space assets while using advanced precision-guided weapons. Throughout the wars in Kosovo, Iraq, and Afghanistan, the United States has achieved modernization of military weapons through various space-based intelligence surveillance and reconnaissance activities, UAV attacks, and precision-guided weapons.

The Pentagon is establishing a defense space strategy to support the national space policy. The 2020 Defense Space Strategy, which aimed to secure the U.S. space advantage and ensure important national interests in future space, identified the main goals of future space defense. First, to build comprehensive military interests in space, the United States aims to reorganize the U.S. defense organization by securing military interests and improving its space-based intelligence monitoring and reconnaissance capabilities and command and control capabilities. Second, it integrates military space power into nation, combined, and joint operations. Space operations, reconnaissance surveillance capabilities, and military professionals are included in military planning to integrate space forces into U.S. military operations. Third, it aims to curb enemy attacks in space and create a strategic environment by establishing standards and regulations for activities in space. Lastly, the United States hopes to strengthen space cooperation in cooperation with allies, private partners, commercial entities, and other U.S. government agencies.²¹⁾

As of May 1, 2022, 5,465 satellites are in operation in space. Among them, 3,433 (62%) are operated by the United States, 541 by China (10%), 172 by Russia (3%), and 1,319 by other countries (24%). Among other countries, Japan operates 84, and South Korea operates 17 satellites. The United States uses space with the world's best technology, carrying out navigation, communication, and reconnaissance activities through the world's largest satellites and space assets.²²⁾

2. South Korea's Space Policy and Space Power

(1) South Korea's Space Policy

The 1980s laid the foundation for South Korea's space activities. With the importance of the universe in national security and the increase in the economic benefits of the future space industry, South Korea established the Aerospace Research Institute after enacting the Aerospace Industry Development Promotion Act in 1987. In the 1990s, South Korea began its space projects in earnest, launched Korea's first satellite, Woori Star 1, in 1992, and established the mid- to long-term basic plan for space activities (1996-2015) in 1996 to enact the first national space activities plan. In addition, in 1999, it launched a multi-purpose practical satellite to

21) US DOD 2020; Ministry of Science and ICT and Korea Research Foundation 2020, pp. 71-72.

22) UCS Satellite Database 2022,

<https://www.ucsus.org/sites/default/files/2022-08/Changes%20to%20the%20UCS%20Satellite%20Database%205-1-22.pdf>(accessed: October 22, 2022).

secure the first Earth observation satellite. In the 2000s, South Korea consolidated the foundation of its space program. In 2002, a liquid propulsion science rocket was developed to secure the basic technology to manufacture a liquid rocket. In 2005, the Space activities Promotion Act was enacted to lay the legal foundation for space activities. In 2006, the National Space Commission was established and a comprehensive government plan for space activities was established while major space activities-related issues were deliberated. In 2007, the first basic plan for space activities was established to secure Korea's independent space activities capabilities, contribute to the development of the national economy by entering the global space market, improve the quality of life of the people, and promote public pride through successful space activities.

In the 2010s, Korea entered the space developing nation. It became a country with geostationary satellites with the launch of Chollian satellites in 2010. In the following year, the second basic plan for space activities promotion was prepared to establish Korea's core space technology early, expand the use of satellite information, and expand private participation to strengthen the space industry. In addition, in order to revitalize space activities, space technology personnel were trained, space-related infrastructure was expanded, the system was reorganized to advance space activities, and various international cooperation has increased. After the successful launch of the Naro in 2013, a mid- to long-term space development plan was prepared to suggest a long-term space development direction until 2040. In 2018, the 3rd Basic Plan for Space development Promotion was proposed to improve the safety and quality of life of the people and practical space development, specifying the space activities plan by 2022 and setting the vision and goal of space activities by 2040.²³⁾

In the 2020s, South Korea was able to secure self-launching capabilities through the development of Korean Space launch vehicle, diversify satellite development, and upgrade and diversify Korea's space activities capabilities through space exploration. In January 2021, the 3rd Space activities Promotion Plan was announced to promote the independence of Korean space launch vehicle technology, advance satellite utilization services and development such as disaster and real-time national crisis response, start space exploration such as lunar exploration, launch a national satellite navigation system, and switch space activities. In June 2021, South Korea reviewed and confirmed the third amendment to the basic space activities plan, including the use of solid rocket fuel and the expansion of private companies' participation in space activities projects in the new space era. In December 2022, the 4th Basic Plan for Space activities Promotion will be announced.

23) Ministry of Science and ICT, Korea Research Foundation, pp. 96-106.

(2) South Korea's Space Strategy and Space Power

South Korea's space activities are undertaken by major national space activities institutions and private space companies under the leadership of the Ministry of Science and ICT. Satellite and space launch vehicle development programs are underway while complying with the purpose of peaceful use of space. In 2021, Korea announced three major space strategies: promoting space exploration projects through the development of Korean space launch vehicles, developing satellites such as multi-purpose satellites and communication and weather satellites that support public services, and strengthening private space activities capabilities in the New Space era.²⁴⁾ After the success launch of the Nuri in 2022, space technologies such as satellites and space launch vehicles will be transferred to private systematic comprehensive companies to leap up the space industry.

Along with the development of satellites, an important step in space activities is to secure its own space launch capability in its own country without using space launch services from other countries. South Korea's space launch vehicle technology was restricted by the ROK-U.S. missile guidelines. However, the complete lifting of the ROK-U.S. missile guidelines in 2021 allowed the country to develop its space launch vehicle. Starting with science rockets developed in 1993, South Korea succeeded in launching Naro in 2013 through technical cooperation with Russia, developed its own Korean SLV capable of launching 1.5 tons of practical satellites, successfully launched Nuri, a Korean SLV, in 2022, and launched CubeSat produced by performance verification satellites. The successful launch of Nuri contributed to South Korea's independent space launch capabilities, as securing space transport capabilities, including the production of space launch vehicles, will determine the success or failure of Korea's space program to meet the demand for satellite launch in Korea.

South Korea began to produce and launch its very first satellite in 1992. After launching the first multipurpose satellites in 1999, five multi-purpose satellites were used for low-orbit observation while the Chollian satellite and geostationary complex satellite were used to provide weather and marine information. Optical imaging and radar satellites are used for civilian purposes, although they are limited due to resolution and revisit cycles for use in military operations. Amid intensifying space competition, South Korea has failed to increase the number of the space programs, which requires a large budget and period for technology development and investment.

South Korea's space budget is \$700 million, which is lower than those in advanced countries such as \$47.6 billion in the United States and \$3.3 billion in Japan. The nation's space technology should be improved by continuously expanding investment in space activities.²⁵⁾In the defense sector, according to the

24) Dong-A Science, March 25, 2021

mid-term defense plan of the Ministry of National Defense for 2019-23, the proportion of space development budget, including reconnaissance and communication satellites, is very low at 2.8% of the total budget for defense improvement.²⁶⁾ The South Korean military is seeking to expand its U.S.-dependent intelligence surveillance and reconnaissance assets to shift operational control, but it is forced to rely on U.S. intelligence capabilities due to a lack of technology to develop ultra-precision optical sensors and satellite sensors. It is necessary to strengthen space operational capabilities such as technology development of satellite sensors for the transition of operational control and the ability to operate multiple information satellites and monitor space.

The ROK Air Force has mainly carried out missions to space operations and support in the defense sector. Since the second half of 2020, the Army and Navy became interested in space operations and established space activities plans to reorganize and start research. The Air Force continues to invest in training professionals in the space sector and lead space operations to advance to the Aerospace Force.

The Air Force receives space information from the U.S. Space Command on space objects and satellites over the Korean Peninsula, issues warnings about space activities threatening South Korean satellites to threats, and supports safe space activities. However, the level of sharing U.S. space situation awareness information is limited to conduct independent space surveillance activities like advanced space powers .

In 2020, the Air Force announced its three-stage space development plan to prepare for the future space era and announced its major space capabilities. In the first stage, the Space Odyssey Project was proposed, which would link missile defense and space surveillance systems by 2030 and strengthen missile defense capabilities and centralized control in the space area. In the second stage, the Air Force integrates air and space operational capabilities by 2040 and launches satellites by cargo aircraft.²⁷⁾ As the importance of space operations increases in national security, it is necessary to provide national support for the implementation of space plans and strengthen ROK-U.S.-Japan trilateral space cooperation.

3. Japan's Space Policy and Space Power

(1) Japan's Space Policy

In 1969, Japan signed the Japan-U.S. Space Technology Agreement, laying the foundation for important aerospace cooperation with the United States. Japan was able to invest in space activities thanks to its own space launch vehicle test and its

25) Profiles of Government Space Programs(Euroconsult, 2020.

26) Yoon Woongjik, 2017, p. 7.

27) National Defense Daily, May 26, 2020; Kim Gwi-geun, June 28, 2021.

cooperation with the United States in the space field. In 2008, the Framework Act on Space was enacted that defined the framework for Japan's space activities and utilization. In 2009, the Framework Plan on Space Activities Policy was drafted based on the Framework Act on Space. After proclaiming the 4th Basic Plan for Space in 2020, Japan announced its basic policy on space development over the next 20 years. The Fourth Space Master Plan stated that Japan would contribute to the national interest by strengthening the industrial, scientific and technological foundation to support strategic and independent space activities and strengthening strategic cooperation with major allies.²⁸⁾

(2) Japan's Space Strategy and Space Power

Japan successfully launched the first Ohsumi satellite in Asia in February 1970 and carried out space activities in cooperation with the United States. Japan's space activities are actually investing in the space sector with various missions by the Japan Aerospace Exploration Agency (JAXA), which conducts private space programs. The private space sector is investing mainly in space science and exploration, manned spaceflight, and space launch vehicles. Japan began space exploration in 1985 and launched the first Hitten lunar probe in 1990. Hayabusa 2, the Japanese spacecraft launched in 2014, recently landed on an asteroid and succeeded in collecting asteroid soil samples. Japan manufactures and operates KIBO, an experimental module, on the International Space Station (ISS), conducts various space experiments and contributes to civilian international space cooperation. As the importance of space security increases, the defense sector is developing information gathering satellites (IGS) for earth observation purposes and next-generation communication satellites to strengthen communication security.

Japan expressed its commitment to peaceful space activities. However, due to the increased missile threat from North Korea, it shifted its policy and developed space programs for military use. The satellite operated as an observation satellite is believed to have a military-grade resolution. Increased threats shown in North Korea's passage of Taepodong missiles into Japanese airspace in 1998 and continued ballistic missile tests compelled Japan to continue its research and development in space to strengthen its security. Japan enacted the Framework Act on Space in 2008 and began to engage in military activities in space through the Japan Aerospace Exploration Agency (JAXA) Act. In addition, space launch vehicles were developed, which enhanced their technological capabilities to build ballistic missiles.²⁹⁾

In 2018, Japan's defense plan outlined the strengthening of Japan's military power in new areas such as space and cyber. Since 2019, defense budgets have been

28) ICT, White Paper on Space, p. 83.

29) Han Eun-ah, "A Study on Military Changes in Japan's Space Development Policy," *Journal of Japanese Research*, No. 37, 2013, pp. 97-121.

allocated to new areas such as space and cyber. It appears that anti-satellite attack weapons and space debris that threaten the peaceful use of space are affecting Japan's space operations.³⁰⁾ Based on advanced space science and technology, Japan continues to cooperate with the United States in space to cope with the U.S.-China space competition in Northeast Asia.

Through cooperation with the United States, Japan is strengthening its intelligence sharing and surveillance of military activities in North Korea and around the Korean Peninsula by improving the reconnaissance capabilities of Japanese satellites. Japan operates a total of 84 satellites, eight of which are reconnaissance satellites, three electron optics, and five radar imaging satellites to monitor North Korea's missile launch bases and military activities to maintain all-weather intelligence surveillance capabilities. It plans to operate 10 spy satellites by 2025. North Korea's continued missile provocations provide Japan with an opportunity to boost its space military. Japan has an H-2A liquid fuel rocket that can carry 16 tons of satellites in low orbit around the Earth and operates Epsilon Launch Vehicle, a solid fuel rocket for 1.2 tons of warheads that can be launched at all times. Japan is preparing to launch the H3 with the next-generation rocket and plans to secure competitiveness in the international commercial satellite launch market by shortening international cooperation, shortening the launch period, and lowering the launch cost. It also has its own GPS called the Quasi-Zenith Satellite System (QZSS) to support navigation services, precision guidance of the Japanese weapon system, and communication services.³¹⁾

Recently, Japan signed a memorandum of understanding to send SDF personnel to the U.S. Space Command as liaison officers and is strengthening space cooperation at the level of alliance with the United States. Japan is building a space alliance with the United States by participating in a global Sentinel joint exercise that monitors space objects and tracks satellites in space. In addition, the Air Self-Defense Force established a space operation unit in 2020 and is strengthening its space military operational capabilities by conducting satellite surveillance missions in China and Russia.³²⁾ To strengthen Japanese space security, the Space Operations Unit will be fully operational with 100 people by 2023. Japan plans to operate a ground-based SSA system to strengthen its space situational awareness (SSA) capability in 2023 and will launch an SSA satellite by 2026. Japan continues

30) Cho Eun-il, National Defense Research Institute, "The Major Contents and Security Implications of the 2020 Japan Defense Budget," *Analysis of the Security Situation in Northeast Asia*, April 20, 2020, p.3.

31) Kim Kyung-min, "Japan's satellite, aircraft carrier, and submarine power, the gap with Korea is widening," *JoongAng Ilbo*, September 27, 2019, <https://www.joongang.co.kr/article/23588217> (accessed: October 24, 2022).

32) Yoon Sang-ho, "Japanese Self-Defense Forces liaison officer deployed to the U.S. Space Command at all times" ...*The U.S.-Japan Alliance for Space*," *Dong-A Ilbo*, April 5, 2021.

to cooperate with the United States in space to cope with the U.S.-China space race in Northeast Asia, strengthening its responsiveness to anti-satellite weapons and space debris that threaten the peaceful use of space.³³⁾

IV. Challenges and Strategies for Strengthening Space Cooperation among the ROK, the United States and Japan

1. South Korea-U.S.-Japan Space activities Cooperation

The ROK-U.S.-Japan trilateral space cooperation has not yet been formed. Space cooperation is underway between the United States and Japan. Space cooperation between South Korea and the United States began in the private sector before the government. It was developed in cooperation with TRW Company in the United States when it manufactured the KOMPSAT (Korean multi-purpose satellite)-1, Korea's earth observation satellite. Since then, satellite development has mainly cooperated with European company like Airbus and France's Thales. However, a number of satellite components and subsystems are imported from the United States through procurement and are used to make satellites. In 1996, the Ministry of Science and Technology signed an MOU for space science cooperation between NASA and Korea to start space cooperation. After agreeing to strengthen space cooperation between the two countries through the 2008 Korea-U.S. summit, the Ministry of Education and NASA signed a letter of intent for space technology cooperation with the United States in 2008, laying the foundation for the space cooperation agreement system.³⁴⁾ The Korea-U.S. space cooperation was continued through the Korea-U.S. Space Cooperation Dialogue in 2014 and the Korea-U.S. Space Policy Dialogue in 2015.³⁵⁾

At the 2015 Korea-U.S. summit, the two countries made efforts to conclude the Korea-U.S. space cooperation agreement that would strengthen the Korea-U.S. space cooperation agreement. In 2016, the efforts so far were finally achieved through the signing of the Korea-U.S. space cooperation agreement. South Korea was the first Asian country to sign an intergovernmental space cooperation agreement with the United States, which resulted in the establishment of a legal framework for the two governments' space cooperation.³⁶⁾ As Korea's space technology development and space capabilities in the international community are recognized, demands for international cooperation such as intergovernmental cooperation are increasing. Korea's participation in the Artemis program and the

33) Cho Eun-il, 2020, p.3.

34) Ministry of Science and ICT and Research Foundation, p. 287.

35) Hwang Jinyoung, 2018. p. 12.

36) Cho Hong-je, 2017, p. 493; Munhwa Ilbo, March 4, 2016.

lifting of the South Korea-U.S. missile guidelines will allow South Korea and the United States to cooperate and collaborate on space after the 2021 summit.

In the 2020 Korea Technology Level Assessment Report, the United States is the world's top space technology holder. Among them, South Korea's space launch vehicle development and operation technology is 60% of the U.S., and space environment observation and surveillance analysis technology is 55.5% of the U.S., and space exploration and utilization technology is 56% of the U.S.³⁷⁾ In order for Korea to strengthen space cooperation with the United States, it is very important to share space policy information, expand space cooperation measures on areas of common interest between the two countries, and jointly respond to space-related international issues.³⁸⁾

Since 2013, the defense sector has been sharing space situational awareness information and exchanging space experts through the Korea-U.S. Defense Space Cooperation Conference. Recognizing the importance of space cooperation, South Korea and the United States are strengthening space cooperation as South Korea and the United States jointly respond to increasing space threats.³⁹⁾ The Korean Air Force has been conducting a working-level meeting of the ROK-U.S. space integration team since 2012, jointly writing scenarios for space operations during various command post drills, specifying how to carry out space operations to support combined operations, and analyzing space threats.⁴⁰⁾

Space cooperation between South Korea and Japan is essential because Japan is a world space technology powerhouse, and there is a high possibility of cooperation. However, due to historical issues, cooperation at the national level is limited. Since early 2002, Korea has started cooperation in space activities with the Japan Space activities Agency (NASDA) and has participated in the International Space Congress (IAC) to continue cooperation in space and space education programs between the two countries. It also continues to strengthen international networks and cooperate in space activities between Korea and Japan through multilateral consultative bodies such as the Asia-Pacific Space Agency Forum (APRSF), led by Japan.⁴¹⁾

President Biden emphasized space cooperation among the three countries when he visited Korea and Japan in 2022.⁴²⁾ The formation of a space cooperation system among South Korea, the United States, and Japan is crucial for peaceful space activities and response to Chinese space threats. It can contribute to peace in

37) Korea Institute of Science and Technology Planning and Evaluation, 2021, p. 27.

38) Lee Jun, 2021, p. 2.

39) National Defense Daily, May 25, 2021

40) National Defense Daily, November 19, 2020

41) White Paper on Space Development, p. 298.

42) Sung Ho-cheol, "The reason why Biden didn't forget the space cooperation card in Korea and Japan, May 24, 2022."

Northeast Asia, such as a military cooperation system formed by defense ministers and Joint Chiefs of Staff. Space cooperation among South Korea, the United States, and Japan must be implemented to strengthen the three-way security cooperation to counter North Korea's continued nuclear and missile threats.

2. South Korea-U.S.-Japan Space activities Cooperation Tasks and Strategies

The United States is trying to maintain U.S. space leadership and strengthen its space power through space cooperation with its allies. The three countries can cooperate in space activities, including space technology and space system development, space exploration and environmental research, and space operations. The security crisis on the Korean Peninsula is intensifying due to China's military buildup in Northeast Asia, intense strategic competition between China and the United States, and North Korea's nuclear and missile capabilities.

(1) Space technology and space system development

1) Strengthening Space Technology Cooperation and Exchange

The United States uses international regimes such as MTCR to control exports of space industry-related technologies, builds protections for space industry technologies under U.S. domestic law, and demands compliance from other countries. U.S. domestic laws restrict the transfer of state-of-the-art technologies to Korea, such as the U.S. Department of Commerce's Export Administration Regulations (EAR) and the State Department's International Traffic in Arms Regulation (ITAR) to control dual-purpose products that can be used for space and missiles.⁴³⁾ South Korea sought international cooperation in developing Naro's first-stage engine because of U.S. export regulations. International space cooperation in acquiring and transferring space technology will gain momentum by participating as an international partner in space activities projects, as the ROK-U.S. missile guidelines are lifted and the United States wants to strengthen space cooperation with Korea. It is possible to increase investment in the private space industry and improve aerospace technology in Korea. It is very important to continuously expand Korea's investment in space activities and foster professional technical personnel. If the size of R&D investment in the space industry and the level of aerospace technology in major countries are rated at 100 percent, Japan can rate it at 89 percent and Korea at 60 percent.⁴⁴⁾

In 1970, Japan changed its independent rocket development policy and promoted the introduction of technology from the United States, which Japan destroyed its Q rocket program, received liquid rocket technology from the United States, and successfully launched its own N-1 rocket five years later.⁴⁵⁾ South Korea should

43) Kim Jongbeom, 2020, p.73.

44) OECD (2016); Korea Institute of Science and Technology Planning and Evaluation (2021).

push for cooperation with the United States and Japan to jointly respond to security threats in Northeast Asia caused by North Korea's nuclear and missile advances and improve South Korea's low space technology.

South Korea's satellite development technology shows that satellite and main body design have technological capabilities, but the localization rate of components of payloads, which are important sensors of satellites, is 41%, and technology should be developed through Korea-U.S. technology cooperation. As the joint statement on satellite navigation cooperation was signed through the ROK-U.S. summit, South Korea is expected to further strengthen satellite navigation interoperability with the United States as it begins to build a Korean satellite navigation committee system (KPS).⁴⁶⁾ In addition, by actively participating in the U.S.- or Japan-led space symposium and actively participating in the International Space Cooperation Organization, the latest space technologies can be acquired and space cooperation between the three countries can be strengthened.⁴⁷⁾

South Korea should take advantage of the good opportunity for space cooperation among South Korea, the United States, and Japan to develop its space and defense capabilities. In the space sector, it may be possible for the three countries to form a strong space technology alliance like military cooperation. South Korea needs to present the field of space cooperation ahead of time to what the United States and Japan want from Korea's space capabilities. Unlike in the past, when Korea received unilateral technical support and control from the United States, we should take lessons from the fact that South Korea and the United States have developed a complementary partnership to respond to threats on the Korean Peninsula, including China and Russia, and strengthen space cooperation for three countries' space security.⁴⁸⁾ Korea should cooperate with the United States and Japan in producing small satellites, which are recognized as Korea's strengths in space, and develop Korea's weaknesses such as satellite sensor capabilities, space rocket engine production, space exploration, and cooperation in exchanging the latest space technologies.

Space cooperation between Korea and Japan began in 2000. The Korea Aerospace Research Institute and NASDA agreed to hold the Earth Observation Working Group meeting and study on joint utilization of ISS. Korea held a joint seminar on the utilization of the Korea-Japan space environment and cooperation following the hosting of the Asia-Pacific Forum (APRSAF) organized by Japan in Korea. Korea and Japan continue bilateral talks between Korea and Japan on space exploration and space experiments, but, space exchange programs between Korea and Japan should be more active through space cooperation.

45) Han Eun Ah, 2013, p. 103.

46) Yoo Yong-won, June 17, 2021.

47) Lee Jun, 2017, pp. 87-89.

48) Lee Sang-hyun, 2019, p.99.

2) Revitalizing Commercial Space Activities between South Korea, the United States, and Japan

With the emergence of countries and various companies seeking to secure commercial interests using the potential of the space sector, the space industry is growing significantly and space technology is further developing the Fourth Industrial Revolution.⁴⁹⁾ In the New Space era, private U.S. space companies actively participate in space activities with the U.S. government, increasing the U.S. national space competitiveness. A private space company launched a space travel service, and SpaceX signed a contract with NASA to successfully carry astronauts to the space station. In South Korea, commercial space activities in various fields such as space launch vehicle projects and small satellite production by private space companies are also increasing. Strengthening business investment and research and development activities among private companies can boost commercial space activities and strengthen the technological competitiveness of private companies by boosting commercial space activities. Korea should secure space manpower, enhance technology, and promote South Korea-U.S.-Japan startup exchanges by strengthening support for space startups.

(2) Space exploration and space environment research

1) Increase participation in manned and unmanned lunar exploration

Korea will be able to enhance its capabilities in the space age by participating in the U.S.-led Artemis program, improving Korea's space activities capabilities, and enhancing the participation of private space companies. Artemis is the first U.S. project to land a female astronaut on the moon in 2024, using innovative state-of-the-art science and technology and systems. It aims to send astronauts to Mars by 2028 based on the technology and exploration experience gained from lunar exploration.⁵⁰⁾ Japan plays a major role in U.S. space activities, including the development of payloads, while participating in the U.S. Artemis program.

The lunar orbiter project, Korea's first space exploration program, launched the Danuri lunar probe from the United States on August 5, 2022, and is currently flying toward Moon orbit and is scheduled to arrive at Moon orbit in mid-December. It uses Space X's Falcon 9 rocket to secure the core technology needed for lunar exploration through orbiters, landers, scientific payloads, and deep space communications. Space exploration technology can contribute to economic effects such as spin-offs in the future and will provide the foundation for Korea to become a space power by achieving the development of the space industry through cooperation with NASA. Japan successfully launched a lunar probe in 1990 and has long experience and technology in space exploration. Thus, South Korea can take advantage of the

49) Jeong Heonju, 2021. p. 10.

50) NASA, 2021.

strength of Korea's space development personnel and combine advanced space technology from the United States and Japan to conduct space exploration programs. Participation in the space exploration program will also enable South Korea to acquire technologies for commercial use and military purposes of space, such as satellite docking, removal of space debris, and satellite surveillance.

2) Strengthening Space Meteorology and Space Environment Cooperation Project

In order to actively cope with global climate change caused by global warming, the Korea Meteorological Administration and the U.S. Oceanic and Atmospheric Administration (NOAA) discussed weather satellite development and satellite information sharing in 2017 and shared Arirang 5 satellite data between Korea Aerospace Research Institute and NOAA in 2018. The Korea Aerospace Research Institute was jointly conducted with NASA's Solar System Exploration Research Institute, a joint space science research project, and Korea Astronomy & Space Science Institute is working with NASA to research solar physics, including the development of solar observation equipment. Since 2014, researchers have been dispatched for space cooperation to expand Korea's role in global space science and technology by jointly participating in space science research with the United States or international organizations.⁵¹⁾ It will also contribute to strengthening weather information exchange and cooperation with Japan as well as the United States by sharing Korea's marine and meteorological satellite data with Japan and jointly researching various space weather and environmental fields such as marine monitoring, climate change, and disaster prediction.

(3) Space Operations and Military Security

1) Strengthening the South Korea-U.S.-Japan Defense Space Exchange

Notable dialogues on space cooperation between South Korea and the United States include the Defense Cooperation Working Group (SCWG) and the Space Policy Dialogue hosted by the U.S. State Department and NASA. The Ministry of National Defense has been operating SCWG regularly since 2013, sharing information on the Space Situational Awareness (SSA), training military space experts, participating in joint space operation drills, and conducting joint research and development of the Korea-U.S. space policy. It operates the electronic optical satellite monitoring system and plans to launch the first military reconnaissance in 2023, which is a good opportunity to strengthen the combined intelligence monitoring and reconnaissance capabilities such as joint use and intelligence sharing by the ROK-US Defense Ministry.⁵²⁾

51) Lee Joon and Hwang Jin Young 2017, pp. 28-31.

52) Kim Gwi-geun, May 31, 2021.

South Korea conducts military exercises with Japan, but cooperation in the defense and space sectors is not underway. If we promote exchanges in the defense and space sectors as part of strengthening cooperation in the defense sector, such as combined military exercises between South Korea, the United States, and Japan, we will be able to contribute to strengthening defense cooperation, such as monitoring and sharing of North Korea's nuclear and missile threats.

By training space-related military professionals and participating in the U.S. Space Military Course and Space University education, they will be able to form a wide network of space-related connections and acquire expertise. The ROK Ministry of National Defense needs to establish a leading space force enhancement plan and establish a space organization to strengthen space surveillance and space operational capabilities through the participation of the Army and Navy.

2) Joint Response to Space Threats from China, Russia, and North Korea

The recent launch of a Chinese spacecraft, the construction of a Chinese-led space station, and the strengthening of cooperation between China and Russia in space activities could pose a threat to U.S. space operations. China's possession of anti-Satellite (ASAT) attack capabilities and attempts to militarize space pose a major threat to U.S. space security. After conducting the first satellite attack experiment in 2007, China continued to modernize its anti-satellite attack weapons in 2010, 2013, and 2014.⁵³⁾ Russia conducted kinetic satellite attack tests in 2017 and 2020. In 2020, it is strengthening its attack capability against U.S. satellites through weapons tests for ground-based direct-ascending satellite attacks.⁵⁴⁾ Recently, North Korea has been threatening South Korea-U.S. space assets by electronic jamming, EMP attacks, and hacking attacks on the South-U.S. ground space system. Recently, North Korea succeeded in developing a super-powerful EMP bomb. As the threat of EMP to the U.S. and South Korea increases, the U.S. Air Force is planning a response plan, and the South Korean Air Force also needs to join in developing countermeasures.⁵⁵⁾

V. Conclusion

In response to the question of why the three countries should cooperate in space activities, South Korea should establish a specific plan for the necessity of ROK-US-Japan space activities cooperation and future space activities cooperation development plans. ROK-U.S.-Japan space activities have developed from

53) Space News, January 11, 2016.

54) US Space Command, 2020.

55) Pry 2021; JoongAng Ilbo, June 24, 2021.

discussions for pure space science and technology development in the past and are changing to a situation requiring cooperation and the performance of complementary roles such as joint space exploration cooperation and joint response to space threats. Space cooperation in the defense field by the ROK-U.S.-Japan military training should not only disseminate and share information about space object threats in outer space but also allow South Korea's space power to be practically applied to military operations and security fields. South Korea should draw up a development plan through an objective analysis of Korea's space power to determine which areas to focus on.

It is a great opportunity for South Korea to demand that the US strengthen Korea-US space activities along with the signing of an agreement on a manned lunar exploration program. In the space launch vehicle field, South Korea attempted to develop its own in accordance with the ROK-US missile guidelines and MTCR but relied heavily on Russia for technological development for the development of the Naro. It was launched with Russian core technologies, such as engine manufacturing, that were not freely transferred to South Korea due to international technology transfer controls. In the case of Japan, it was provided space launch vehicle technology from the United States. Japan currently has the ability to operate reconnaissance satellites and build Earth reentry vehicles that can be converted into ballistic missiles, thereby gaining superiority and economic benefits in the international space market.

The space industry is increasing investment as world powers recognize it as a core field of the future industry. Based on these discussions, this study intends to present the following policy suggestions.

First, we need to move beyond the idea that South Korea's space activities are a waste of the national budget. Space technology has a huge ripple effect. For example, various technological developments such as infrared sensors, MRI, and LASIK have been tested in space and later used in our daily lives. There were also skeptics about the development of a space launch vehicle, which requires an astronomical budget as Naro's second launch failed. The third launch was successful based on the lessons learned from the failure of the Naro launch, and the Nuri was launched successfully in 2022. It provides convenience in daily life such as navigation information and satellite imagery through space activities and has a great impact on high-tech industries such as military security, satellite communication, disaster warning, soil measurement, and geographic information construction.

Second, it is necessary to closely analyze the international space activities situation, establish South Korea's space policy, and implement the space activities plan. The competition for supremacy by major powers in space is an opportunity for the United States to strengthen the ROK-U.S.-Japan space cooperation, such as South Korea's participation in the U.S. lunar exploration program, and to develop South Korea's space science and technology. The United States needs partners such

as South Korea and Japan to engage and maintain space security in its allies. South Korea, the United States, and Japan must analyze the strengths and weaknesses in space activities cooperation and analyze the opportunities and crises that South Korea can afford to make good use of the opportunities of space cooperation. South Korea's participation in the manned lunar exploration program in May 2021 could strengthen the space alliance with the United States as an ally in space and strengthen cooperation with Japan in the space field.

Third, space cooperation is not limited to scientific and technological development or economic gains. The competition of great powers in outer space is recognized as an important space in addition to the land, sea, and air domains and is a key area for warfare. The great powers are in an invisible race for dominance in space. The importance of South Korea-US-Japan space cooperation should be recognized from a security perspective as it can advance South Korea's science and technology in the era of the 4th industrial revolution and improve the defense space capabilities of South Korea, the US, and Japan in the context of increasing threats from China's space and North Korea's ballistic missiles.

Fourth, the operation of the Korea-US-Japan cooperative organization should be activated to facilitate cooperation in defense and civil space fields between South Korea, the United States, and Japan and to resolve major issues and limitations. In addition to the private space activities cooperation between the US NASA, KARI of Korea, and JAXA of Japan, it is necessary to strengthen space cooperation between the defense authorities of the US, Korea, and Japan. Defense space cooperation between the US and Japan is a way to actively respond to China's space threats and North Korea's security threats. South Korea is participating in joint space training with the United States and participating in space military education at US space education-related institutions.

Fifth, it is necessary to establish an independent space agency, such as the Korea Space Agency, that will play the role of a space activities control tower in South Korea and lead international cooperation between the United States and major advanced space activities countries.⁵⁶⁾ Major advanced countries in space, such as NASA in the United States, Germany's National Aeronautics and Space Administration, France's National Space Center, China's National Aeronautics and Space Administration, and Japanese Strategic Headquarters for National Space Policy, have government organizations dedicated to space activities. A new Korean space agency should be used as a good opportunity for the development of South Korea's space power by strengthening cooperation in space activities between Korea, the United States, and Japan and revitalizing the development of the space industry.

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56) Lee Chang-jin, 21/06/10.

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The Influence of Naval Competition between the United States and China on the Militarization over Asian Maritime Claims

Jonghwan Han

Abstract

Recent interactions between China and the United States have displayed intense competition between the two great powers and signaled intensified instability in Asian waters: A collision between a Chinese fighter and a U.S. Navy EP-3 in 2001, harassment of Chinese vessels to the survey ship USNS Impeccable in 2009, and a dangerous encounter between a U.S. naval warship, Decatur, and a Chinese naval warship, Lanzhou, near the Spratly Islands in 2018. These skirmishes in Asian maritime areas have aroused great interest from scholars and practitioners who study conflictual behaviors between the two great powers, the United States and China. This research focuses on how naval power dynamics between the United States and China influence their conflictual behaviors in Asian waters. Similar to the hegemonic stability arguments, as the challenger (China) decreases a naval power gap with the dominant state (the United States), the former becomes dissatisfied with and questions the existing order, which increases uncertainty over Asian waters. Empirical results show that as China modernizes its naval power and reduces a naval power gap with the United States, the number of conflictual behaviors over maritime claims in Asia increases.

Keywords: *Naval Competition between the U.S. and China, Maritime Claims, Asia*

Introduction

Two major trends are notable in interstate conflict studies. First, disputes over maritime areas have been increasing while competition to conquer land has been decreasing. According to the Issue Correlates of War (ICOW) project,¹⁾ among issue claims over land, river, and maritime areas from 1900 to 2001, 86 maritime claims²⁾ occurred during that time period, which is two times more likely than land and river claims. Second, since the end of the Cold War, the central point of interstate interactions and the world economy has moved from Europe to Asia.³⁾ The frequent use of terms that represent the great power competition between the U.S. and China, such as the New Cold War and Cold War 2.0, shows the importance of Asia in explaining issues in world politics.⁴⁾ These two trends, naturally, tell that skirmishes over maritime areas in Asia, such as the South China Sea and East China Sea disputes, have aroused great interest from scholars and practitioners to study conflictual behaviors among states and great powers.

In 2016, even though the International Court of Justice in the Hague delivered no legal bases for China's arguments around its artificial islands in the South China Sea,⁵⁾ China has continuously argued for its sovereignty and sovereign rights over these artificial islands and surrounding maritime areas. To deal with the controversial issues in the South China Sea, China has routinely deployed naval warships to consolidate its arguments over the disputed maritime areas. Even though the United States is not a direct party to the dispute, it has repeatedly warned that any disruptions of sea traffic or free navigation in the area will not be tolerated⁶⁾ because these assertive actions of China in the South China Sea have substantially influenced the U.S. strategic and economic interests in the Asia-Pacific region. As part of the efforts to maintain stability in the sea in Asia, the U.S. Navy has conducted the Freedom of Navigation Operations, which

1) ICOW is a research project that collects systematic data on contentious issues over land, rivers, and maritime areas. Data is available on the ICOW Web site at <http://data.icow.org>.

2) Maritime claims involve diplomatic contentions between two or more states over the access to or the usage of maritime areas. The South China Sea disputes and the Senkaku/Diaoyu Islands disputes are common examples of maritime claims. More details will be discussed later.

3) Jo Inge Bekkevold and Geoffrey Till, "International Order at Sea: What It Is. How It Is Challenged. How It Is Maintained," In *International Order at Sea How it is challenged, how it is maintained*, eds. Jo Inge Bekkevold and Geoffrey Till (New York: Palgrave Macmillan, 2016), pp. 7-9.

4) U.S. Congressional Research Service, "Renewed Great Power Competition: Implications for Defense—Issues for Congress(2022)," See <https://sgp.fas.org/crs/natsec/R43838.pdf>, p. 35.

5) Jane Perlez, "Tribunal Rejects Beijing's Claims in South China Sea," *The New York Times*, July 12, 2016.

6) Geoffrey Till, *Seapower A Guide for the Twenty-First Century*, 2nd Ed. (New York: Routledge, 2009), p. 290.

sometimes led to several skirmishes between the United States and China. For example, a collision between a Chinese fighter and a U.S. Navy EP-3 in 2001, harassment of Chinese vessels to the survey ship USNS Impeccable in 2009, and a dangerous encounter between a U.S. naval warship, *Decatur*, and a Chinese warship, *Lanzhou*, near the Spratly Islands in 2018, clearly show an increasing uncertainty and instability between two great powers in Asian waters. As these examples show, Asian waters, including the South China Sea, have emerged as an arena of strategic competition between the United States and China.

As the primary means of foreign policy in the sea, naval power has been commonly used to support states' foreign policy behaviors in the sea, which range from coercive to pacifying options.⁷⁾ Naval power is the most appropriate means to influence opponents by overcoming the problem of "stopping power of water"⁸⁾ to project power.⁹⁾ There are no exceptions for the United States and China. Frequent and aggressive interactions between the two great powers and maritime claimants over Asian waters are a function of naval power. Thus, one question can be raised. How do naval power dynamics between the United States and China influence conflictual behaviors over maritime claims in Asia?

Similar to the hegemonic stability arguments, as the challenger (China) decreases a naval power gap with the dominant state (the United States) in Asian waters, the former becomes dissatisfied with and questions the existing order, which increases uncertainty over Asian waters. Empirical results show that as China modernizes its naval power and reduces a naval power gap with the United States, the number of conflictual behaviors over maritime claims in Asia increases.

This article proceeds as follows. Part one explains the concept and importance of maritime claims. Part two develops my theoretical arguments about how naval power dynamics between the United States and China influence the occurrence of militarized disputes over Asian maritime claims. Part three specifies a research design to test a hypothesis, and the last part discusses empirical results, implications, and limitations of this research.

Maritime Claims

The ICOW project defines maritime claims as an explicit contention between

7) Ken Booth, *Navies and Foreign Policy* (New York, NY: Holmes & Meier Publishers, 1979), p. 251.

8) It is necessary to project power in order to influence other states' behaviors. When compared to land, the projection of power at sea is difficult because the sea hinders power projection. Thus, without an appropriate means, power projection at sea is limited. Refer to John Mearsheimer, *The Tragedy of Great Power Politics* (New York, NY: Norton, 2014), p. 114.

9) Jonghwan Han, "A Vanguard of Foreign Policy over Maritime Claims: Naval Power rather than National Power," *The Korean Journal of Defense Analysis*, Vol. 32, No. 2(2020), pp. 315-316.

two or more states over the access to or the usage of maritime areas. It includes a wide range of contentions about sovereignty or the usage of maritime space, ranging from verbal quarrels to wars. Compared to other types of issue claims over land and rivers, maritime claims have an inherent problem: uncertain borderlines. It is clear to divide the land into pieces and assign individual rights to hold, while establishing boundaries of nonstationary resources, especially water, is vague and unclear.

After the adoption of the United Nations Convention on the Law of the Sea (UNCLOS) in 1982, which proclaimed criteria for boundaries of territorial waters, contiguous zones, continental shelves, and Exclusive Economic Zones (EEZs),¹⁰ discordances among coastal states over maritime areas have been intensified. In addition, rising demands for natural resources in the sea and fishing have dramatically increased the possibility of maritime claims. To be specific, according to the ICOW project, maritime claims are the most frequent type of claims over territorial issues that began between 1900 and 2001.¹¹ Table 1 indicates the total number of each type of ICOW claims that began between 1900 and 2001. Among 157 issue claims initiated between 1900 and 2001, more than half of them (54.8 percent) were maritime claims, which is more than double the rate of land claims (35) and river claims (36).

<Table 1> The number of each type of ICOW claims that began between 1900 and 2001

Type	Maritime claims	Land claims	River claims	Total
Number of claims (%)	86 (54.8%)	35 (22.3%)	36 (22.9%)	157 (100%)

10) "Territorial waters" are maritime areas that stretch from the baseline (usually the mean low-water mark) out to 12 nautical miles (nm). Within territorial waters, coastal states can exercise sovereignty. "Contiguous zones" are maritime areas that stretch from the baseline out to 24nm. Within contiguous zones, coastal states can exercise authority for customs, fiscal, immigration, and sanitary issues. "Continental shelves" are seabed areas up to 350nm from the baseline. Within continental shelves, coastal states have sovereign rights over non-living and living resources. "Exclusive Economic Zones (EEZs)" extends 200 nm from the baseline. Within EEZs, coastal states have exclusive rights regarding the exploration and the usage of living and non-living resources. Refer to Victor Prescott and Clive Schofield, *The Maritime Political Boundaries of the World, 2nd ed.* (Leiden: Martinus Nijhoff Publishers, 2005).

11) Data is collected from the current published version (1.10) of ICOW Claim-Level Summary Data. The dataset covers land/river/maritime claims in the Western Hemisphere and Europe from 1900 to 2001; it will include the claims made in Asia and the Middle East in the future update. It is available on the ICOW Web site at <http://data.icow.org>.

As <Table 1> demonstrates, when compared to other types of claims, maritime claims have been the most frequent claims. It seems maritime claims will occur more frequently in the future due to the heavy reliance of the world trading system on the sea and the importance of the sea as a food source for the growing world population. These necessities to use and to access to the sea will lead to more intensive competition and tension among coastal states about exclusive rights to use resources in the sea, such as fisheries and offshore oil.

<Table 2> compares the numbers of all types of Militarized Interstate Disputes (MIDs)¹² and fatal MIDs, which result in at least one fatality, over ICOW claims initiated between 1900 and 2001. According to <Table 2>, among all types of claims, maritime claims are most likely to experience all types of MIDs. To be specific, 41.9 percent of maritime claims during this time period experienced one or more MIDs, while 25.7 percent of land claims and 19.4 percent of river claims produced all types of MIDs. Therefore, between 1900 and 2001, maritime claims appear to be the most conflictual type of claims. Relatedly, Nemeth et al. (2014) argue that from the perspective of security and economic importance, maritime claims generate more potential triggering points for militarized conflicts.¹³

<Table 2> Militarization of each type of ICOW claims that began between 1900 and 2001

	Maritime claims	Land claims	River claims
All types of MIDs			
Yes	36 (41.9%)	9 (25.7%)	7 (19.4%)
No	50	26	29
Total	86	35	36
Fatal MIDs			
Yes	6 (7%)	4 (11.4%)	3 (8.3%)
No	80	31	33
Total	86	35	36

12) Militarized Interstate Disputes(MIDs) are defined as “historical cases of conflict in which the threat, display or use of military force short of war by a member state is explicitly directed towards the government, official representatives, official forces, property, or territory of another state. Disputes are composed of incidents that range in intensity from threats to use force to actual combat short of war.” Refer to Daniel Jones, Stuart Bremer, and David Singer, “Militarized Interstate Disputes, 1816–1992: Rationale, Coding Rules, and Empirical Patterns,” *Conflict Management and Peace Science*, Vol. 15, No. 2(1996), p. 163.

13) Stephen Nemeth, Sara Mitchell, Elizabeth Nyman, and Paul Hensel, “Ruling the Sea: Managing Maritime Conflicts through UNCLOS and Exclusive Economic Zones,” *International Interactions*, Vol. 40, No. 5(2014), pp. 711-736.

There have been many quantitative studies that analyze maritime claims. These studies investigate maritime claims based on two different levels of theoretical factors: (1) systemic level: international institutions¹⁴⁾ and systemic level of democracy;¹⁵⁾ and (2) dyadic level: issue salience,¹⁶⁾ past experience,¹⁷⁾ the presence of resources,¹⁸⁾ rivalry,¹⁹⁾ and joint democracy.²⁰⁾ While naval power greatly helps account for states' foreign policy behaviors over maritime areas, surprisingly, there have been few theoretical and empirical studies on interstate conflicts that focus on the role of naval power to explain issues over maritime claims. As Nyman (2013) argues, disputes over maritime claims are primarily conducted by claimants' navies.²¹⁾ Furthermore, factors at the systematic or regional level matter in studying interstate conflicts because they can influence the formation of competitive or peaceful environments for states, such as the level of competition between the dominant and the challenging states. Thus, this research supplements previous literature by focusing on naval power dynamics between the dominant state (United States) and the challenging state (China) to explain issues in Asian waters.

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- 14) Andrew Owsiak and Sara Mitchell, "Conflict Management Regimes and the Management of Land, River, and Maritime Claims," *Political Science Research and Methods*, Vol. 7, No. 1(2019), pp. 43-61.; Holley Hansen, Sara Mitchell, and Stephen Nemeth, "IO Mediation of Interstate Conflicts: Moving beyond the Global versus Regional Dichotomy," *The Journal of Conflict Resolution*, Vol. 52, No. 2(2008), pp. 295-325; Sara Mitchell and Paul Hensel, "International Institutions and Compliance with Agreements," *American Journal of Political Science*, Vol. 51, No. 4(2007), pp. 721-737; Stephen Nemeth, Sara Mitchell, Elizabeth Nyman, and Paul Hensel, "Ruling the Sea: Managing Maritime Conflicts through UNCLOS and Exclusive Economic Zones," pp. 711-736;
- 15) Mark Crescenzi, Kelly Kadera, and Sara Mitchell, "A Supply Side Theory of Mediation," *International Studies Quarterly*, Vol. 55, No. 4(2011), pp. 1069-1094.
- 16) Paul Hensel, Sara Mitchell, Thomas Sowers, and Clayton Thyne, "Bones of Contention: Comparing Territorial, Maritime, and River Issues," *The Journal of Conflict Resolution*, Vol. 52, No. 1(2008), pp. 117-143.
- 17) Paul Hensel, Sara Mitchell, Thomas Sowers, and Clayton Thyne, "Bones of Contention: Comparing Territorial, Maritime, and River Issues," pp. 117-143.
- 18) Áslaug Ásgeirsdóttir and Martin Steinwand, "Distributive Outcomes in Contested Maritime Areas: The Role of Inside Options in Settling Competing Claims," *Journal of Conflict Resolution*, November 23, 2016.; Elizabeth Nyman, "Offshore Oil Development and Maritime Conflict in the 20th Century: A Statistical Analysis of International Trends," *Energy Research & Social Science* 6(2015), pp. 1-7.
- 19) David Lektzian, Brandon Prins, and Mark Souva, "Territory, River, and Maritime Claims in the Western Hemisphere: Regime type, Rivalry, and MIDs, 1901 to 2000," *International Studies Quarterly*, Vol. 54, No. 4(2010), pp. 1073-1098.
- 20) Kelly Daniels and Sara Mitchell, "Bones of Democratic Contention: Maritime Disputes," *International Area Studies Review*, Vol. 20, No. 4(2017), pp. 294-310.
- 21) Elizabeth Nyman, "Oceans of Conflict: Determining Potential Areas of Maritime Disputes," *SAIS Review of International Affairs*, Vol. 33, No. 3(2013), p. 6.

How Naval Power Competition between the United States and China Influences the Occurrence of Militarized Interstate Disputes over Maritime Claims in Asia

The theories about hegemonic stability and international hierarchy insist that the presence of preponderant hegemonic power leads to stability in the system, since states advantaged by the existing order naturally follow the system to further their interests, and states disadvantaged by the status quo have no choice but to subordinate to the current rules due to considerable power disparity. However, different rates of growth resulting from industrialization, population growth, and technological innovations cause the fluctuation or decline of the dominant power, which is followed by the rise of challenging states undergoing drastic developments. In this case, the decline of dominant power creates leeway for dissatisfied states to further their interests. In other words, if the dominant power remains in a preponderant position, challenging states have no incentive to counter the dominant state. Under the overwhelming power of the dominant state, those satisfied with the status quo, of course, follow the existing order to get security and economic benefits. Even if some states are dissatisfied with the status quo, they are usually too weak to counter the dominant state. In contrast, conflictual behaviors are more likely when the power of challenging states reaches that of the dominant state. Accordingly, the wax and wane of the dominant power followed by the rise of challenging states creates disorder among states.²²⁾

There should be no exceptions on issues over the sea. A preponderant naval power creates and maintains order in the sea while other states follow and subordinate to the order forced by the dominant naval power due to considerable disparity in naval power. As Lake (2009) mentions, the hierarchical order in the system has been largely formed and maintained based on projectable military power. In the sea, naval power is the most appropriate type of military power that allows states to overcome obstacles to project military capability over the sea.

Since World War II, as the global leader, the United States has shaped the political and economic order in the sea based on its preponderant naval power.²³⁾ The United States Oceans Policy in 1983 states that

22) Robert Gilpin, *War and Change in World Politics* (Cambridge: Cambridge University Press, 1981), pp. 156-185; Duncan Snidal, "The Limits of Hegemonic Stability Theory," *International Organization*, Vol. 39, No. 4(1985), pp. 579-614.

23) Martin Murphy and Toshi Yoshihara, "Fighting the Naval Hegemon: Evolution in French, Soviet, and Chinese Naval Thought," *Naval War College Review*, Vol. 68, No. 3(2015), p. 13.

the United States has long been a leader in developing customary and conventional law of the sea...The United States will not, however, acquiesce in unilateral acts of other states designed to restrict the rights and freedom of the international community in navigation and overflight and other related high sea uses...The United States will continue efforts to achieve international agreements for the effective management of the sea.²⁴⁾

As part of these efforts, the United States has conducted the Freedom of Navigation Operations (FONOPs), which consists of (1) consultations and representations by the U.S. diplomats and (2) operational assertions by the U.S. military force. The FONOPs in the South China Sea conducted by the U.S. naval warships are recent examples. While it is difficult to find jurisdictional authority for the United States to urge peaceful settlements and management of South China Sea disputes, the United States has repeatedly argued that it will not tolerate any disruptions of sea traffic or free navigation.²⁵⁾ As the dominant naval power, the objective of the U.S. policy in the South China Sea has been to maintain regional stability in Asia and to deter conflicts as an option for dispute management. Thus, the United States has deployed naval platforms in the South China Sea.²⁶⁾ Compared to other regional oceans, the more frequent FONOPs have been conducted in the South China Sea. <Table 3> shows a list of the top 10 countries which have been the targets of the FONOPs from 1991 to 2021.²⁷⁾ It shows that 149 FONOPs (28 percent) were conducted in the South China Sea, and six of the top 10 targets challenged by the United States are coastal states neighboring the South China Sea. It shows the great interest of the United States in the South China Sea.

24) The full statement is available on the Web site at <https://www.state.gov/documents/organization/143224.pdf>.

25) Geoffrey Till, *Seapower A Guide for the Twenty-First Century*, 2nd Ed., p. 290.

26) Peter Dutton, "China's Maritime Disputes in the East and South China Seas," *Naval War College Review*, Vol. 67, No. 3(2014), p. 16.

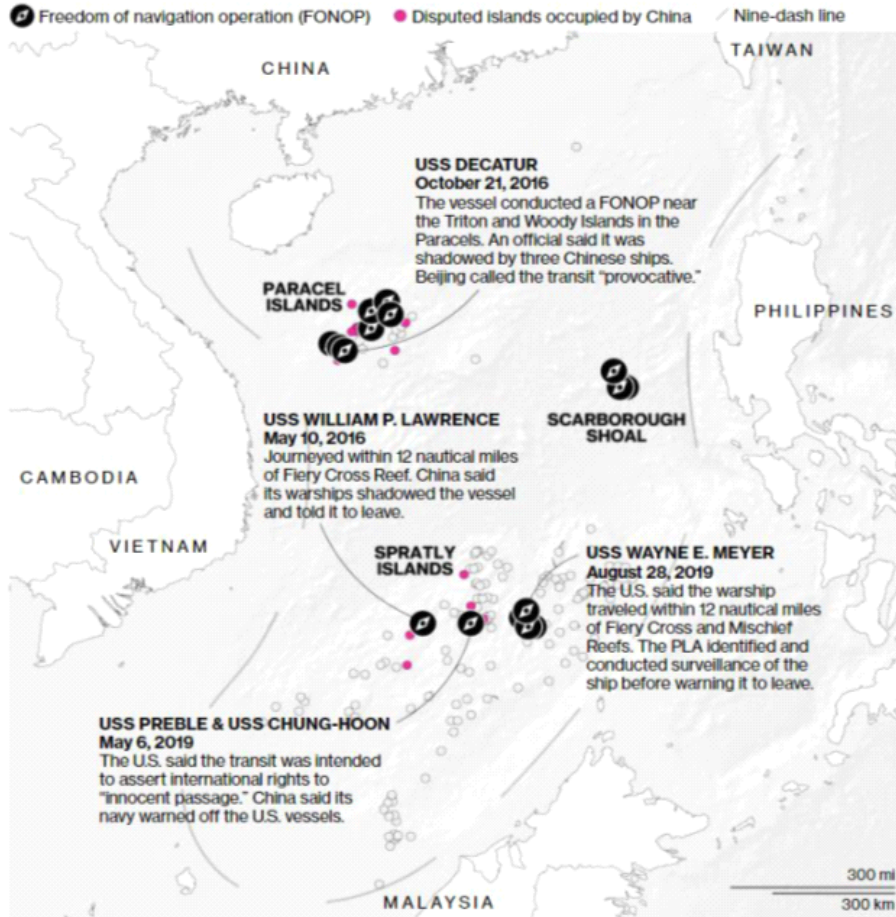
27) Since FY 1991, the U.S. Department of Defense has published an annual FONOPs report. Table 3 summarizes annual reports from FY 1991 to FY 2021. Each year's annual report is available on the U.S. Department of Defense website at <http://policy.defense.gov/OUSDP-Offices/FON>.

<Table 3> The top 10 targets of the FONOPs, 1991 ~ 2021

Rank	Country	Number of FONOPs	Remarks
1	China	47	South China Sea
2	Iran	32	-
3	Oman	25	-
4	Maldives	25	-
5	The Philippines	23	South China Sea
6	Malaysia	21	South China Sea
7	India	21	-
8	Cambodia	21	South China Sea
9	Vietnam	20	South China Sea
10	Indonesia	17	South China Sea
Total number of FONOPs		530	-

According to <Figure 1>, which shows recent FONOPs in the South China Sea, the recent FONOPs conducted by the U.S. naval platforms have concentrated on disputed islands occupied by China.

<Figure 1> FONOPs in the South China Sea since 2016



Source: U.S. Congressional Research Service, *U.S.-China Strategic Competition in South and East China Seas: Background and Issues for Congress*(2021).

There is little doubt that the United States, as the dominant naval power, has played a role as a rule-maker and rule-enforcer to maintain stability in the sea. However, as the South China Sea disputes demonstrate, in tandem with the rapid naval modernization since the 1980s, China has excessively claimed its rights in the South China Sea and has expanded its influence on the regional maritime areas.

Until the 1980s, border threats from the North (the Soviet Union) were the most important security issue for China. However, the collapse of the Soviet Union in 1991 and successive territorial agreements with other states provided China with

opportunities to improve its economic development by focusing on maritime areas. Finkelstein (2007) mentions that under the stable strategic situation on the northern front since the 1990s, China could improve the strategic circumstances of the southern front by strengthening maritime defense, maneuvering on high seas, and maintaining maritime interests.²⁸⁾

Based on the transition of strategic priority from the Soviet Union to the South China Sea, Indian Ocean, and other maritime areas in the late 1980s,²⁹⁾ the Chinese navy adopted “Active Offshore Defense” as its official naval strategy. This strategy went beyond its traditional “guerrilla war at sea.” The adoption of Active Offshore Defense reflected China’s changing priorities – especially Deng’s focus on economic modernization and the realization of the increasing importance of maritime areas for China’s future development.³⁰⁾ Along with the adoption of the new maritime strategy, China has modernized and has, since the 1980s, built up a powerful navy in order to maintain and control Chinese near-seas as well as offshore areas. The U.S. Congressional Research Service report in 2017³¹⁾ mentions that

Observers believe China’s naval modernization effort is oriented toward developing capabilities for doing the following: addressing the situation with Taiwan militarily, if need be; asserting and defending China’s territorial claims in the South China Sea and East China Sea, and more generally, achieving a greater degree of control or domination over the South China Sea; enforcing China’s view that it has the right to regulate foreign military activities in its 200-mile maritime exclusive economic zone (EEZ); defending China’s commercial sea lines of communication (SLOCs), particularly those linking China to the Persian Gulf; displacing U.S. influence in the Western Pacific; and asserting China’s status as a leading regional power and major world power (emphasis added).

Relatedly, the U.S. Congressional Research Service report in 2015 describes that Chinese naval modernization can challenge the U.S.-led international order in the sea, especially in the Western Pacific.³²⁾ The U.S. Department of Defense also

28) David Finkelstein, “China’s National Military Strategy: An Overview of the Military Strategic Guidelines,” in *Right Sizing the People’s Liberation Army: Exploring the Contours of China’s Military*, eds. Roy Kamphausen and Andrew Scobell (Carlisle: SSI, 2007), pp. 91-93.

29) Ian Storey and You Ji, “China’s Aircraft Carrier Ambitions: Seeking the Truth from the Rumors,” *Naval War College Review*, Vol. 57, No. 1(2004), pp. 77-93.

30) Office of Naval Intelligence, “China’s Navy 2007,” See <https://fas.org/irp/agency/oni/chinanavy2007.pdf>.

31) U.S. Congressional Research Service, “China Naval Modernization: Implications for U.S. Navy Capabilities - Background and Issues for Congress(2017),” See https://www.everycrsreport.com/files/20171213_RL33153_f2d4205a10334bce2d0fcd608595af90da8a6b7d.pdf, p. 1.

32) U.S. Congressional Research Service, “Maritime Territorial and Exclusive Economic Zone (EEZ)

mentions that the rapid military modernization in Asia, particularly Chinese naval modernization, has significantly increased the possibility of miscalculations or conflicts over maritime areas in Asia.³³⁾ In addition, the 2021 Interim National Security Strategic Guidance mentions that

We must also contend with the reality that the distribution of power across the world is changing, creating new threats. *China, in particular, has rapidly become more assertive. It is the only competitor potentially capable of combining its economic, diplomatic, military, and technological power to mount a sustained challenge to a stable and open international system*(emphasis added).³⁴⁾

As the hegemonic stability arguments mention, the rise of challengers followed by a reduced power gap between the dominant power and challenging states increases uncertainty. Since the 1990s, China has dramatically modernized its naval forces by increasing the quantity and quality of naval warships. According to the U.S. Congressional Research Service, in terms of the number of principal naval warships, such as aircraft carriers, destroyers, and submarines, China became the largest navy in the world in 2015.³⁵⁾ It does not necessarily mean that China has the strongest naval power in the world. However, it is difficult to deny that China has decreased the naval power gap with the United States and reduced the advantages and leverage of the United States in the sea. Some argue that in some maritime areas, such as the South China Sea, China's naval power already surpassed U.S. naval power.³⁶⁾ China's dramatic naval modernization and the reduced naval power gap between the United States and China emboldened China to change the existing order forcefully and challenge the rules made by the United States. This changing distribution of capabilities, naturally, created more competitive and volatile environments that exacerbated insecurities and instability in the region.³⁷⁾

In response to these China's naval modernization and frequent deployments of naval platforms to the sea, the United States has shifted its focus to the Indo-Pacific area and assigned its most capable and modernized naval warships and aircraft to the

Disputes Involving China: Issue for Congress(2018),” See <https://fas.org/sgp/crs/row/R42784.pdf>.

33) U.S. Department of Defense, “Asia-Pacific Maritime Security Strategy(2015),” See <https://www.defense.gov/Portals/1/Documents/pubs>.

34) The White House, *Renewing America's Advantage: Interim National Security Strategic Guidance*(March 2021), pp. 7-8

35) U.S. Congressional Research Service, “China Naval Modernization: Implications for U.S. Navy Capabilities - Background and Issues for Congress(2017),” p. 7.

36) U.S. Congressional Research Service, “China Naval Modernization: Implications for U.S. Navy Capabilities - Background and Issues for Congress(2017),” p. 39.

37) Adam Liff and John Ikenberry, “Racing toward Tragedy? China's Rise, Military Competition in the Asia Pacific, and the Security Dilemma,” *International Security*, Vol. 39(fall 2014), p. 52.

Into-Pacific area. To be specific, since the United States Pacific Command was renamed to the United States Indo-Pacific Command in 2018, the U.S. Navy has deployed about 60 percent of naval forces in the area.³⁸⁾ This naval modernization and militarization between the two great powers in the sea could increase the risk of miscalculation and misunderstanding that cause an escalation of tension or conflict.³⁹⁾

Not only for the United States, China's expansive actions in the East and South China Sea also cause the frequent deployment of neighboring states' naval warships, such as Japan, the Philippines, and Vietnam to defend their sovereignty and sovereign rights over the disputed maritime areas. Similarly, these frequent deployments of naval warships over the disputed maritime areas could lead to a crisis or conflict between China and neighboring states as well as the United States due to the obligations of bilateral security treaties. In other words, China's assertive claims and behaviors in the South China Sea and the East China Sea, which violate international maritime law, lead to friction with the United States and other neighboring states in the region and increase the risk of inadvertent crisis.⁴⁰⁾

In sum, when Chinese naval power increases and approaches U.S. naval power in Asia, the former becomes dissatisfied with and questions the existing order formed by the United States, which increases uncertainty over the sea in Asia. In turn, this situation provides dissatisfied states with leeway to pursue their interests in maritime areas. Therefore, as China increases its naval power and decreases the naval power gap with the United States, China is more likely to challenge the order and stability, which can lead to more violent behaviors over the sea in Asia. So, the following hypothesis can be developed.

When the disparity of naval power between the United States and China decreases, the number of militarized disputes over maritime claims in Asia increases.

Research Design

Instead of estimating the entire ICOW Asian maritime claims time period (1900-2010),⁴¹⁾ this research focuses on maritime claims from 1989 to 2010. The

38) Krishn Kaushik, "60% Navy forces in Indo-Pacific region now: US Navy chief, *Indianexpress*, October 13, 2021.

39) U.S. Congressional Research Service, "U.S.-China Strategic Competition in South and East China Seas: Background and Issues for Congress(2021)," See <https://sgp.fas.org/crs/row/RL42784.pdf>, p. 44.

40) U.S. Congressional Research Service, "U.S.-China Strategic Competition in South and East China Seas: Background and Issues for Congress(2021)," p. 54.

41) The current published version (1.10) of the ICOW project does not include maritime claims in Asia but only includes those in the Western Hemisphere and Europe. Thus, this research uses

main focus of this research is how a naval power gap between the United States and China influences conflictual behaviors over Asian maritime claims. Thus, there is no need to include the time period when China did not have the appropriate naval power to compete with the United States. As many scholars and research institutes analyze, Chinese naval modernization started at the end of the 1980s with the beginning of the end of the Cold War. There were several symbolic events that represent the end of the Cold War, including the fall of the Berlin Wall in 1989, the dissolution of the Warsaw Pact in 1991, and the Collapse of the Soviet Union in 1991.⁴²⁾ I estimated models from the start of these pivotal events at the end of the Cold War. Thus, the temporal domain of the analysis is 1989–2010. The spatial domain for the analysis is the states in Asia. <Table 4> summarizes the measurement of variables.

<Table 4> Measurement of variables

Variables		Measurement	Source
Dependent Variable		The number of Militarized Interstate Disputes (MIDs) over an Asian maritime claim dyad-year * Mean: 0.10 / S.D.: 0.31 / Min.: 0 / Max.: 2	ICOW maritime dyad-year data
Independent Variable	Relative Naval Power between the U.S. and China	<u><i>Stronger naval power between the U.S. and China</i></u> $\frac{U.S. \text{ naval power} + \text{China's naval power}}{2}$ * Mean: 0.91 / S.D.: 0.03 / Min.: 0.86 / Max.: 0.96	Crisher and Souva's naval data ⁴³⁾
Control Variables	Strategic Location	Whether or not maritime claims occur in the vicinity of important international straits * 0: 305 obs. (37.2 %) / 1: 514 obs. (62.8 %)	ICOW maritime dyad-year data
	Migratory Fishing Stocks	Whether or not migratory fishing stocks are present over disputed maritime areas * 0: 190 obs. (23.2 %) / 1: 629 obs. (76.8 %)	ICOW maritime dyad-year data

preliminary data (which is underway) about the maritime claims in Asia, and preliminary data were used for the author's doctoral thesis (*The Influence of Naval Power on the Militarization of Maritime Claims*, the University of Iowa, 2019).

42) U.S. Congressional Research Service, "Renewed Great Power Competition: Implications for Defense—Issues for Congress(2022)," p. 29.

Variables		Measurement	Source
Control Variables	Other Issue Saliency	The sum of the four remaining indicators of the issue saliency variable * Mean: 7.18 / S.D.: 1.63 / Min.: 3 / Max.: 8	ICOW maritime dyad-year data
	UNCLOS Signatory	Whether or not at least one of the claimants signs the UNCLOS in a given calendar year * 0: 85 obs. (10.3 %) / 1: 734 obs. (89.7 %)	UNCLOS website ⁴⁴⁾
	Relative Naval Power between Claimants	<i>Stronger state's naval power</i> <i>Stronger state's naval power + Weaker state's naval power</i> * Mean: 0.86 / S.D.: 0.15 / Min.: 0.5 / Max.: 1	Crisher and Souva's naval data
	Joint Democracy	Whether or not both claimants' POLITY IV index of democracy scores are six or higher * 0: 720 obs. (88 %) / 1: 99 obs. (12 %)	POLITY IV ⁴⁵⁾

Dependent Variable

This research is mainly interested in the number of MIDs directly related to maritime.⁴⁶⁾ The ICOW Asian maritime dyad-year data includes the number of MIDs directly related to maritime claims. The dependent variable (unit of analysis: a maritime claim dyad-year), *the Number of MIDs*, is measured by the total number of MIDs that begin in a given maritime claim dyad-year in Asia. The maximum number of MIDs is 2, and the minimum number of MIDs is 0. As <Figure 2> shows, the occurrence of MIDs over maritime claims is rare (approximately 89.9 percent is coded 0).

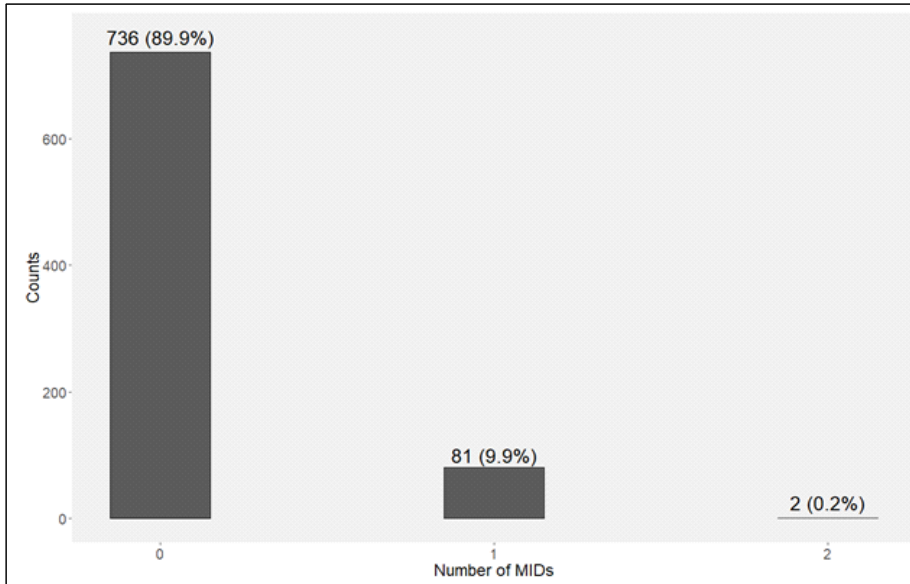
43) Benjamin Crisher and Mark Souva, "Power at Sea: A Naval Power Dataset, 1865–2011," *International Interactions*, Vol. 40(2014), pp. 602-629.

44) http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm.

45) Monty Marshall and Keith Jagers, *Polity IV Dataset*(College Park: Center for International Development and Conflict Management, 2009).

46) Claimants over maritime claims can experience MIDs other than maritime claims, but MIDs over other issues are not taken into account here.

<Figure 2> The Distribution of MIDs over Asian Maritime Claims



Independent Variables

The number and total tonnage of major naval warships have been commonly used to measure naval power.⁴⁷⁾ Whereas the number of naval warships is a simple and easy way to measure naval power, it does not reflect the quality of naval warships, such as their offensive and defensive weapon system. Usually, heavier naval warships have better and more weapon systems and operate at sea for a longer period of time. Thus, to incorporate the quality dimension of naval power, I measure naval power based on the total tonnage of warships,⁴⁸⁾ using Crisher and Souva's

47) Benjamin Crisher, "Naval Power, Endogeneity, and Long Distance Disputes," *Research and Politics*, January-March(2017), pp. 1-6.; Jonathan Markowitz and Christopher Fariss, "Power, Proximity, and Democracy: Geopolitical Competition in the International System," *Journal of Peace Research*, Vol. 55, No. 1(2018), pp. 78-93; Jonathan Markowitz, Christopher Fariss, and Blake McMahon, "Producing Goods and Projecting Power: How What You Make Influences What You Take," *Journal of Conflict Resolution*(August 24, 2018), see <https://journals.sagepub.com/doi/abs/10.1177/0022002718789735>.; Sean Bolks and Richard Stoll, "The Arms Acquisition Process: The Effect of Internal and External Constraints on Arms Race Dynamics," *Journal of Conflict Resolution*, Vol. 44, No. 5(2000), pp. 580-603.

48) Numerous other factors, such as the effectiveness of command and control, training, morale, and geography, are also important to determine naval power. However, when considering data

2014 naval data that contain the total tonnage of warships in 73 countries from 1865 to 2011. *Relative Naval Power between the United States and China* is measured by dividing the stronger naval power between the United States and China by the sum of U.S. naval power and China's naval power. It ranges from 0.5 to 1.0. 0.5 means perfect parity, while 1.0 signifies perfect disparity, which means a strong naval power overwhelms the other.

$$\text{Relative Naval Power between the United States and China} = \frac{\text{Stronger naval power between the U.S. and China}}{\text{U.S. naval power} + \text{China's naval power}}$$

Control Variables

The computation formula, source, and descriptive statistics of control variables are provided in <Table 4>. Thus, for this section, I briefly discuss the theoretical reason and expectation for each control variable based on the previous literature on maritime claims. First, as opposed to the presence of stationary natural resources, such as oil and gas, the presence of migratory fishing stocks within the maritime boundaries (*Migratory Fishing Stock*) can lead to a high level of uncertainty. In other words, by nature, migratory fishing stocks are transnational and fluid, which makes coastal states uncertain in determining how to allocate exclusive rights over straddling fish stocks. This situation can lead to intense competition for resources and, in turn, to conflictual behaviors.⁴⁹⁾ Besides the distributional problem, in many cases, maneuvering fishing vessels involves maneuvering naval warships to protect fishing vessels and deter foreign poachers from illegal intrusions. Therefore, if migratory fishing stocks present near disputed maritime areas, it naturally leads to the maneuvering of fishing vessels to catch more straddling fishing stocks. This situation, in turn, results in the frequent maneuvering of naval warships to protect their fishing vessels over disputed maritime areas. In this case, the frequent maneuvering of naval warships from one claimant to protect their fishing vessels can lead to the movements of the opponent's naval warships. Ultimately, this situation can cause unnecessary encounters or militarization between two claimants' navies over disputed maritime areas. Thus, I expect that there will be more MID's over maritime claims when the maritime claims are related to migratory fishing stocks.

Second, Strategic Location reflects whether maritime claims occur in the vicinity

constraints and the importance of naval warships in explaining issues in the sea, the total tonnage of warships can be the best realistic indicator to measure naval power.

49) Victor Prescott and Clive Schofield, *The Maritime Political Boundaries of the World*, 2nd ed., p. 216.

of international straits. International straits play a central role in the movement of goods, energy, and service over the sea, which contributes to coastal states' economic development in the globalized world. Therefore, conflictual behaviors over maritime claims near international straits, which can hinder maritime trade, have been deterred by international efforts. Thus, maritime claims near international straits are less likely to experience militarized disputes.

Third, the ICOW maritime dyad-year data categorize maritime claims into six different types of issues. Since two indicators — migratory fishing stocks and strategic location — are already included as separate variables, *Other Issue Saliency* is measured by the sum of the four remaining indicators: whether or not the maritime area is associated with claimants' homeland, whether or not the maritime area has fishing resources, whether or not the maritime area is connected to land territorial claims, and whether or not the maritime area has natural resources (oil and gas). A greater saliency of the issues is expected to escalate to more militarized disputes over maritime claims.⁵⁰⁾

The fourth variable representing the effect of the international institution in the sea is *UNCLOS*, which provides procedures for the usage and peaceful management of maritime claims. *UNCLOS* not only defines the important concepts of maritime territories but also provides procedures for filing and managing maritime claims peacefully, such as a requirement to agree to third-party settlements when bilateral negotiations fail. Thus, the adoption of *UNCLOS* has a significant effect on alleviating militarized conflicts among disputants. I expect that if at least one of the claimants signed *UNCLOS*, they are less likely to initiate militarized disputes over maritime claims.

Fifth, when states implement conflictual options, they have no choice but to consider relative capabilities. As many proponents of the power transition theory⁵¹⁾ argue, when two states are equally powerful, it is difficult to assess who would be superior in case of battles. This uncertainty increases the possibility of miscalculation about the outcome of conflicts. Thus, maritime claimants with a similar level of naval power are more likely to have militarized disputes over maritime claims. *Relative Naval Power between Claimants* is measured by dividing the stronger state's naval power by the sum of the stronger and the weaker states' naval power. In addition, 3.6 percent of observations (30 maritime claim dyad-years) in which both claimants are not listed on Crisher and Souva's naval data (2014) in a given calendar year⁵²⁾ are dropped because it is impossible to calculate relative naval

50) Paul Hensel, Sara Mitchell, Thomas Sowers, and Clayton Thyne, "Bones of Contention: Comparing Territorial, Maritime, and River Issues," p. 136.

51) Douglas Lemke, *Regions of War and Peace* (New York, NY: Cambridge University Press, 2002), pp. 21-27.; Douglas Lemke and Suzanne Werner, "Power Parity, Commitment to Change, and War," *International Studies Quarterly*, Vol. 40, No. 2(1996), pp. 235-260.

52) Crisher and Souva's naval data(2014) adopts minimal criteria: (1) at least one frigate class

power when both claimants do not have naval power (the denominator of the following formula is 0)

$$\text{Relative naval power} = \frac{\text{Stronger state's naval power}}{\text{Stronger state's naval power} + \text{Weaker state's naval power}}$$

Sixth, to examine the impact of claimants' level of democracy, *Joint Democracy* is included. As many scholars of the democratic peace theory⁵³ argue, the shared norm of democracy and structural constraints to initiate conflicts make pairs of democracies less likely to use militarized options to solve contentious issues. Thus, if both maritime claimants are advanced democracies, they are less likely to experience militarized disputes over maritime claims.

Method

Since the dependent variable is countable events, Poisson regression or negative binomial regression would be a good candidate for statistical models. Compared to negative binomial regression, Poisson regression requires a strong assumption that the conditional variance is equal to the conditional mean: equidispersion. Therefore, a test for this assumption can be a good criterion for choosing an appropriate model because a violation of this assumption has similar consequences to those for heteroscedasticity in linear regression.⁵⁴ The result of the overdispersion test ($p < 0.96$) shows a failure to reject the null hypothesis, which means the conditional variance is equal to the conditional mean. Thus, I use Poisson regression. In addition, a lack of appropriate error correction with dyad data can cause underestimated standard errors that lead to overestimated t-statistics. To avoid this problem, I use Poisson regression with cluster standard errors by dyad to alleviate potential

warship of 1,000 tons or (2) a submarine. Therefore, states which do not have at least a naval surface warship of 1,000 tons or submarine are excluded from this data.

53) Zeev Maoz and Bruce Russett, "Normative and Structural Causes of Democratic Peace, 1946-1986," *The American Political Science Review*, Vol. 87, No. 3(1993), pp. 624-638; Zeev Maoz and Bruce Russett, *Triangulating Peace: Democracy, Interdependence, and International Organizations*(New York: W.W. Norton, 2001); Zeev Maoz and Nasrin Abdolali, "Regime Types and International Conflict, 1816-1976," *The Journal of Conflict Resolution*, Vol. 33, No. 1(1989), pp. 3-35.

54) Colin Cameron and Pravin Trivedi, "Regression Based Tests for Overdispersion in the Poisson Model," *Journal of Econometrics*, Vol. 46, No. 3(1990), pp. 347-364

dependence across the years of a maritime claim as well as dependence between multiple maritime claims involving the same pair of countries.⁵⁵⁾ Model 3 and Model 4 are for robustness checks. Model 3 generates the results of negative binomial regression to show the model selection does not change the results. In addition, I recode the dependent variable as a binary measure of MIDs and use logit regression because two MIDs are pretty rare (0.2 percent). The results of Model 3 and Model 4 are very similar to those of Model 2, which means the robustness of empirical analyses.

Empirical Results

I begin with a bivariate analysis involving the independent and dependent variables only to show whether or not model specifications influence the empirical results. In other words, to eliminate the possibility that combining the independent variable or the effects of control variables produces biased or artifact empirical results,⁵⁶⁾ I estimate the bivariate model first. Thus, Model 1 in <Table 5> shows a core model with the independent variable, while Model 2 in <Table 5> represents a full model with control variables.

55) Sara Mitchell and Peter Trumbore, "Rogue States and Territorial Disputes," *Conflict Management and Peace Science*, Vol. 31, No. 3(2014), pp. 323-339.

56) Kelly Kadera and Sara Mitchell, "Heeding Ray's Advice: An Exegesis on Control Variables in Systemic Democratic Peace Research," *Conflict Management and Peace Science*, Vol. 22, No. 4(2005), pp. 311-326.

<Table 5> The Effects of Naval Power Dynamics between the U.S. and China on the Number of MIDs over Asian Maritime Claims (unit of analysis: a maritime claim dyad-year)

	Model 1 (Poisson)	Model 2 (Poisson)	Model 3 (Negative Binomial)	Model 4 (Logit)
Relative Naval Power between the U.S. and China	-10.40 *** (3.429)	-9.218 *** (3.286)	-9.218 *** (3.286)	-10.57 *** (4.058)
Relative Naval Power between Claimants		-3.343 *** (1.204)	-3.343 *** (1.204)	-3.863 ** (1.505)
Migratory Fishing Stocks		2.230 *** (0.703)	2.229 *** (0.703)	2.532 *** (0.811)
Strategic Location		-0.802 * (0.433)	-0.801 * (0.433)	-1.052 * (0.610)
Other Issue Salience		0.046 (0.173)	0.046 (0.173)	0.082 (0.208)
UNCLOS		-0.545 * (0.290)	-0.545 * (0.290)	-0.739 ** (0.334)
Joint Democracy		-0.296 (0.247)	-0.296 (0.247)	-0.497 (0.341)
Constant	7.210 ** (3.136)	7.654 ** (3.348)	7.654 ** (3.348)	9.302 ** (4.103)
LR chi2	8.25 ***	35.3 ***	26.3 ***	41.07 ***
N	819	789	789	789
Log Likelihood	-274.8	-242.8	-243.8	-228.9
AIC	553.6	501.5	503.5	473.7

* Note: Entries are coefficients followed by clustered standard errors by dyad, ***p < .01, **p < .05, *p < .1

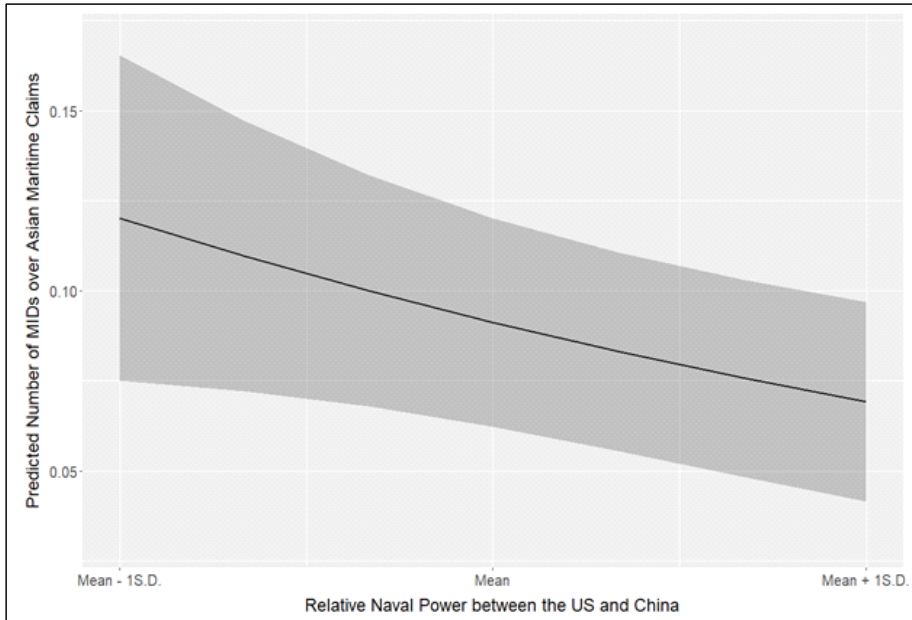
In Model 2, Relative Naval Power between the United States and China produces a negative and significant effect ($p < 0.006$). It means that the disparity of naval power between the United States and China leads to less militarized disputes over Asian maritime claims, which supports the hypothesis. In addition, Model 1, which only includes *Relative Naval Power between the United States and China*, also shows a similar result ($p < 0.003$), which indicates that the variable's effect is not artificial. These results reveal that if China's naval power reaches close to the level of the U.S naval power, China is more likely to challenge the order in the sea dominated by the United States, and such behaviors will likely result in more violent behaviors over maritime claims in Asia. In other words, more Chinese naval warships with the growing frequency and scope of infringing other states' sovereignty and sovereign rights in Asian waters worsen tensions and lead to more clashes or incidents over Asian maritime claims.⁵⁷⁾

<Figure 3> shows the substantive effect. To calculate the substantive effect (the predicted number of MIDs), all other variables are held at their means or modes in the case of dichotomous variables. The variation of Relative Naval Power between the United States and China from one standard deviation below the mean to one standard deviation above the mean changes the predicted number of MIDs over Asian maritime claims from 0.12 to 0.069, which represents a 42.5 percent decrease. Due to a small substantive effect of the independent variable, it looks like that Relative Naval Power between the United States and China does not have a significant influence on the occurrence of conflictual behaviors. However, when considering the rareness of militarized disputes over maritime claims (10%), a small predicted number of militarized disputes are common in other analyses of international conflicts.⁵⁸⁾

57) Adam Liff and John Ikenberry, "Racing toward Tragedy? China's Rise, Military Competition in the Asia Pacific, and the Security Dilemma," pp. 56-57.

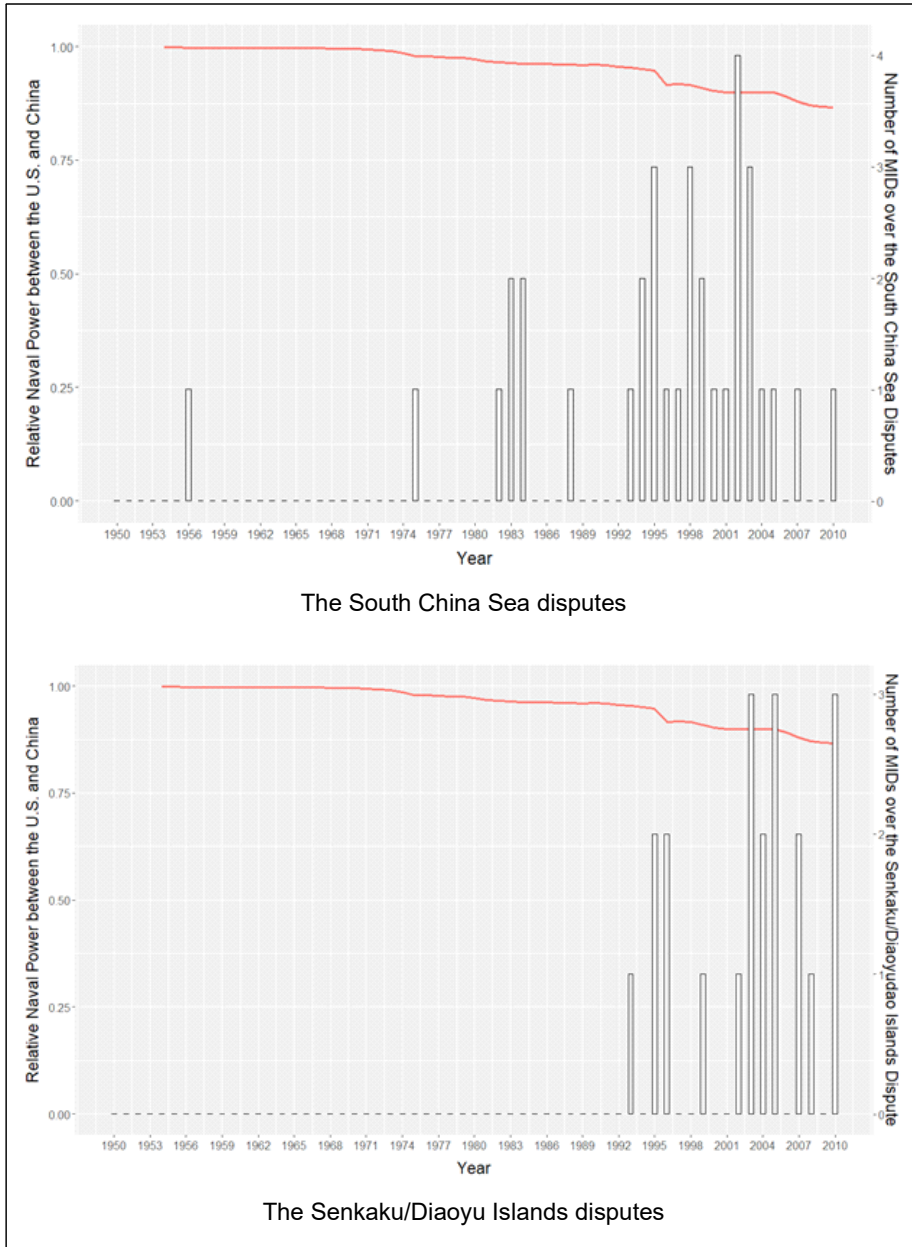
58) Mark Crescenzi, Kelly Kadera, and Sara Mitchell, "A Supply Side Theory of Mediation," p. 1084.

<Figure 3> Substantive effects for the Hypothesis



These results account for the frequent occurrence of conflictual behaviors over Asian maritime claims since the 1980s when China dramatically modernized its naval power. Figure 4 shows the number of MIDs in the South China Sea disputes and the Senkaku/Diaoyu Islands disputes along with relative naval power between the United States and China. The red line indicates the relative naval power between the United States and China. Bars display the number of militarized disputes in a given maritime claim dyad-year. As <Figure 4> clearly shows, the occurrence of militarized disputes over maritime claims is clustered since the 1980s when the relative naval power value between the United States and China decreased. To put it differently, more frequent conflicts over maritime claims occur as China's naval power reaches close to the level of the U.S. naval power.

<Figure 4> The Number of MIDs over Maritime Claims in Asia from the 1950s to the 2010s



In terms of control variables, first of all, *Strategic Location* ($p < 0.07$) and *UNCLOS Signatory* ($p < 0.06$) decrease the number of militarized disputes over maritime claims, while *Migratory Fishing Stocks* ($p < 0.002$) increases the number of conflictual behaviors over maritime claims as expected. In addition, *Relative Naval Power between Claimants* ($p < 0.006$) reduces the number of MIDs over maritime claims. In other words, the disparity of naval power between claimants deters the occurrence of MIDs over maritime claims as expected. *Joint Democracy* ($p < 0.3$) and *Other Issue Salience* ($p < 0.8$) do not show significant results.

Conclusion

This research focuses on relative naval power between two competing states in Asia, the United States and China, to explain militarization over Asian maritime claims. The empirical results support my theoretical arguments. As proponents of the hegemonic stability and international hierarchy argue, when China, the challenging state, enhanced its naval power close to the level of the naval power of the United States, the dominant state in Asia, the former was more likely to challenge the order and the rules formed by the latter, which leads to more conflictual behaviors over maritime claims in Asia.

When considering the trend of Chinese naval modernization, the gap between U.S. naval power in Asia and Chinese naval power is expected to continue to decrease. Thus, we can expect that militarization over maritime claims in Asian waters will be intensified. If more frequent militarized disputes over maritime claims in Asia are expected, how can we deter the occurrence of conflictual behaviors over Asian maritime claims? Based on the results that considerable naval power disparity between the United States and China reduces the number of militarized disputes over Asian maritime claims, maintaining overwhelming dominance of U.S. naval power in Asia against China can be one way to deter the occurrence of conflictual behaviors over Asian maritime claims. Relatedly, recent frequent FONOPs conducted by the U.S. naval warships near the Chinese artificial islands in the South China Sea might have been a clear signal the United States displayed to deter aggressive behaviors between claimants in the South China Sea. However, we should also consider the other side. In other words, we should not ignore another possibility that an increase in U.S. naval power in Asia could lead to unintended naval arms races between the United States and China that can lead to instability over Asian waters.

Although this research shows some meaningful results, it has some limitations. First of all, in order to explain issues in Asian waters, not only the naval power gap between the United States and China but also the relative naval power between China and the power next in rank should be considered.⁵⁹) In other words, naval power dynamics between China and Asian challengers also matter to explain

conflictual behaviors over maritime claims in Asia. Therefore, future research needs to examine how naval power dynamics between Asian naval rivals, such as Japan and China, influence the management of maritime claims in Asia.

Second, in terms of temporal scope, this research only covers Asian maritime claims from 1989 to 2010 due to the temporal frame of the main dataset, the ICOW data. However, when considering an increasing trend of Asian maritime claims in recent years, the temporal domain needs to be expanded to encompass the current maritime claims in Asia.

Third, while this research only focuses on how relative naval power between the United States and China affects the conflictual behaviors over maritime claims in Asia, peaceful settlements between claimants would be an intriguing topic to explore regarding the effect of naval power. As Booth in *Navies and Foreign Policy* (1979) and Cable in *Diplomacy at Sea* (1985) insist, naval power is a primary means of diplomacy, ranging from wars to cooperation between states. Thus, the United States and China, especially the United States, have deployed their naval power to coerce and encourage maritime claimants to conduct bilateral negotiations or accept third-party mediation to reduce tensions and to settle the issues peacefully. Therefore, how the naval power of the United States and China influences the occurrence of peaceful settlement attempts could uncover more about issues over maritime claims. I expect that including these factors in future research can enhance the understanding of various issues over maritime claims.

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59) Øystein Tunsjø, “Global Power Shift, Geography, and Maritime East Asia,” *In International Order at Sea How it is challenged. How it is maintained*, eds. Jo Inge Bekkevold and Geoffrey Till (New York: Palgrave Macmillan, 2016), p. 49.

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Examining the Nexus between Economic Ties at the Kaesong Industrial Complex and Security on the Korean Peninsula: Theoretical frameworks and evaluations

Hyo Joon Chang

Abstract

This article examines the nexus between economic ties and security on the Korean Peninsula by discussing three causal mechanisms. First, economic ties increase opportunity costs to constrain the two Koreas' conflict behavior. Second, inter-Korean economic ties allow either or both to send a costly signal about their resolves during a crisis. Third, economic ties transform domestic interests and preferences in favor of cooperation. Through these analytical lenses, the past operation at the Kaesong Industrial Complex (KIC) did not clearly show its pacifying effect on security on the Korean Peninsula due to its low opportunity costs, weak signaling, and stalled transformation of interests and preferences in both countries. Those who support the liberal peace process with hope for the KIC resumption need to articulate these mechanisms from a long-term perspective while acknowledging the marginal impact of pacifying security effect in the short term. Without measures to improve its efficiency of operation and earn domestic support, the KIC, if reopened, would remain liberals' unfulfilled promise.

Keywords: *Inter-Korean Relations, Economic Cooperation, Security, Kaesong Industrial Complex*

I. Introduction

The Kaesong Industrial Complex (KIC or Complex), a joint North-South Korean manufacturing park in Kaesong, North Korea, has remained closed since February 2016. It was a response by the Park Geun-hye government to North Korea's nuclear test and rocket launch. Despite early inter-Korean détente under the Moon Jae-in government, the hope for the reopening of the KIC gradually dissipated as inter-Korean tensions arose after a failed bilateral summit between Kim Jung-un and Donald Trump. North Korea's demolition of an inter-Korean joint liaison office building in Kaesong in 2019 and the inauguration of the conservative Yoon Seok-yul government delivered a serious blow to the optimism for the KIC's reopening, further increasing the uncertainty of its future.

The KIC has been one of the controversial issues of inter-Korean relations since its establishment in 2002. Some argue that the KIC should have survived political and security crises. They expect the KIC, as the last but important component of connection between the two Koreas, to facilitate economic cooperation, leading to more economic interdependence and eventually peaceful inter-Korean relations.¹⁾ It is rooted in the liberal idea that economic ties decrease the likelihood of inter-state conflict and war.²⁾ By contrast, others contend that security concerns associated with North Korea's continuing attempt to develop missile and nuclear capacity should be heavily weighted in deciding to continue economic cooperation with Pyeongyang.³⁾ This perspective implies that the inter-Korean economic cooperation would not ensure but even jeopardize South Korean security by possibly funding North Korea's nuclear and missile programs. It subscribes to realists' tenet that security trumps the economy and that economic benefits are at best temporary and may have negative security externalities.⁴⁾

The past stop-and-go experiences of the KIC and the current stalemate of nuclear negotiations prompt the advocates for reopening the KIC to make a case for the KIC and inter-Korean economic cooperation in general. They would need more reasons than the economic benefits of using cheap North Korean labor. Realists' relative

1) John Delury and Chung-in Moon, "A Reunified Theory," *Foreign Affairs*, November/December 2014, pp. 179-183.

2) Michael Doyle, "Liberalism and World Politics," *The American Political Science Review*, 1986, pp. 1151-1169; John Oneal and Bruce Russett, *Triangulating Peace: Democracy, Interdependence, and International Organizations* (New York: W. W. Norton & Company, 2001), pp. 127-133.

3) Robert Kelly, "Re-Opening the Kaesong Industrial Zone Would Give North Korea Something for Nothing," *The National Interest*, January 16, 2019, available at <https://nationalinterest.org/feature/re-opening-kaesong-industrial-zone-would-give-north-korea-something-nothing-41742> (accessed on Aug 15, 2021).

4) Katherine Barbieri, "Economic Interdependence: A Path to Peace or a Source of Interstate Conflict?" *Journal of Peace Research*, 1996, pp. 29-49.

gains concerns would come back to haunt the advocates, suggesting that economic gains for Pyongyang, which desperately needs U.S. dollars, would be much larger than the shares for South Korea. Its symbolic image of one small step but a giant leap for the Korean peace process has also been tainted partially by the fluctuating inter-Korean relations in the past decade. It is more than ever clear that the South Korean government would face difficulties in gaining domestic and international support for resuming the operation of the KIC unless the linkage between security and economic cooperation is clearly understood.

However, there has been a lack of a theoretical framework to explain how the KIC and further economic cooperation would affect security on the Korean Peninsula. Most literature on the KIC describes its origin, development, and challenging issues to improve its operation, economic efficiency, and legal frameworks.⁵⁾ Concerning security, the existing studies focus on its political implications or South Korea's decision to shut down the KIC.⁶⁾ The absence of analytical tools has done a disservice to the policy and academic community together. Especially for those who favor engagement with North Korea, it is problematic to simply assume a pacifying effect of economic interdependence on security without offering any mechanism through which it would happen. Likewise, pro-containment and -pressure groups also need a framework to understand the complex relations between economic ties and security. The absence of a clear understanding of the KIC's role and its effect on security hinders both sides from monitoring, evaluating, and predicting the effect of inter-Korean economic cooperation on security. Damages have been already made in South Korea with a flood of politicized arguments over and inconsistent policies toward inter-Korean economic cooperation over the past two decades.

This article contributes to our theoretical understanding of the nexus between economic ties and security on the Korean Peninsula.⁷⁾ It introduces and discusses three causal mechanisms: opportunity costs, costly signaling, and transformation of preference and interests. Economic cooperation between the two Koreas creates greater opportunity costs that would add to the costs of war, lowering the chance of

5) Eul-chul Lim, *Kaesong Industrial Complex, History, Pending Issues, and Outlook* (Haenam Publishing, 2007), pp. 1–245; Bongchul Kim and Ho Kim, “Analysis and Proposals to the Laws in the Kaesong Industrial Complex,” *Korea Journal*, 2014, pp. 80–105; Ralph M. Wrobel, “Ten Years of Kaesong Industrial Complex: a brief history of the last economic cooperation project of the Korean Peninsula,” *Economic and Environmental Studies*, 2014, pp. 125–148.

6) Jamie Doucette and Seung-Ook Lee, “Experimental territoriality: Assembling the Kaesong Industrial Complex in North Korea,” *Political Geography*, 2015, pp. 53–63; Leif-Eric Easley, “Kaesong and Thaad: South Korea’s Decisions to Counter the North,” *World Affairs*, 2016, pp. 21–27; In Seong Kim and Hyun Koo Cho, *Asian Politics & Policy*, 2019, pp. 80–103.

7) Hyo Joon Chang and Scott Kastner, “Economic Interdependence and Conflict,” In *Oxford Research Encyclopedia of Politics*, edited by William R. Thompson (Oxford: Oxford University Press, 2017), pp. 628–645.

war. It also helps them send a costly signal of their intent and resolve to reduce the risk of miscalculation, thus making militarized disputes less likely. Furthermore, interests and preferences on either or both sides can be transformed by a higher degree of economic interdependence, driving inter-Korean relations to be more cooperative.

From these perspectives, the past KIC experiences have not successfully demonstrated the pacifying effects on security. The opportunity costs are not high enough to constrain North Korea from maintaining and developing nuclear weapons and missile programs. Nor did it prevent low-intensive military conflicts. Although both Koreas used the KIC to show their resolves, it was still a function of security concerns, not vice versa, and did not lead to policy or behavioral concessions on security. The lack of domestic consensus in South Korea regarding the KIC and its relation to security on the Korean Peninsula also hindered a transformative effect on the public despite the emergence of stakeholders supportive of inter-Korean economic ties. Without a domestic consensus on its role in facilitating the peace process as well as an expansion of the KIC, the KIC project is likely to be an unfulfilled promise of liberal peace.

The remainder of this article is organized as follows. It first introduces the three causal mechanisms – opportunity costs, costly signaling, and transformation of preferences and interests that link economic cooperation to security on the Korean Peninsula. Next, the KIC experience is empirically evaluated, followed by discussion and implication as concluding remarks.

Theoretically linking economic ties to security

Opportunity costs

The opportunity costs or constraint argument is most frequently discussed in the literature on economic interdependence and war.⁸⁾ Economic ties like trade generate mutual benefits for countries by facilitating the efficient use of limited resources. When two trading partners engage in a militarized conflict, commerce between them is likely to be disrupted. The potential costs of such disruption are expected to be higher among more dependent countries. These economic cut-offs substantively add more cost to the initiation and conduct of war that is costly itself. Political leaders thus become more reluctant to risk a military conflict with countries with which they maintain a high degree of economic interdependence. The constraint effect is particularly more apparent in democratic countries where commercial interests are more represented in the foreign policymaking process.⁹⁾ In today's global economy,

8) Solomon Polachek, John Robst, and Yuan-Ching Chang, "Liberalism and Interdependence: Extending the Trade-Conflict Model," *Journal of Peace Research*, 1999, pp. 405-422.

disrupted bilateral trade may cause more economic troubles due to its reliance on regional and global supply chains as well as networks of production.

Postulations on trade having a constraint effect date to writings by classical liberals such as Montesquieu, Rousseau, Kant, and Smith. The more recent existing scholarship provides some empirical evidence that the opportunity costs constrain state leaders' conflict behavior.¹⁰⁾ Copeland develops a modified version of the opportunity costs-based argument, suggesting that expectations of future trade, rather than trade itself, constrain state behavior. He argues that Japan took preemptive action against the U.S. for fear of future trade cut-offs with the United States over strategic resources such as oils.¹¹⁾ Other studies find similar evidence in the case of an international capital exchange, arguing that leaders are less likely to engage in militarized conflicts to avoid disruption in economically beneficial transactions and continue to appeal to investors.¹²⁾

Costly signaling

The second mechanism linking economic interdependence to security suggests that countries can communicate their resolve more credibly when there is a higher level of economic interdependence between the countries.¹³⁾ This logic is referred to costly signaling or information logic. As a concept developed in a bargaining model of war,¹⁴⁾ it helps understand why bargaining between countries fails and results in military conflict. Fearon explains that countries have private information on their capabilities and resolve, and they are less likely to share this information with others, especially rivals or enemies.¹⁵⁾ Instead, they have strategic incentives to exaggerate true capabilities and resolve just as North Korea frequently does to increase its negotiation leverage. These incomplete and private information problems

9) Michael Mousseau, "Market Prosperity, Democratic Consolidation, and Democratic Peace," *Journal of Conflict Resolution*, 2000, pp. 472-507.

10) Håvard Hegre, John Oneal, and Bruce Russett, "Trade Does Promote Peace: New Simultaneous Estimates of the Reciprocal Effects of Trade and Conflict," *Journal of Peace Research*, 2010, pp. 763-774.

11) Dale Copeland, *Economic Interdependence and War* (Princeton University Press, 2014), pp. 16-20.

12) Margit Bussmann, "Foreign Direct Investment and Militarized International Conflict," *Journal of Peace Research*, 2010, pp. 143-153; Hoon Lee and Sara McLaughlin Mitchell, "Foreign Direct Investment and Territorial Disputes," *Journal of Conflict Resolution*, 2012, pp. 675-703.

13) Erik Gartzke and Quan Li, "War, Peace, and the Invisible Hand: Positive Political Externalities of Economic Globalization," *International Studies Quarterly*, 2003, pp. 561-86; James Morrow, "How Could Trade Affect Conflict?" *Journal of Peace Research*, 1999, pp. 481-489.

14) In a basic setting, two countries compete for a piece of territory. Because a war is costly, they may reach a negotiated settlement that would make them better off.

15) James Fearon, "Rationalist Explanations for War," *International Organization*, 1995, pp. 379-414.

complicate countries' calculations of the costs and benefits of going to war. When a miscalculation on both or either side occurs, they are unable to reach a negotiated settlement and eventually engage in armed conflicts.¹⁶⁾

In this context, economic ties can serve as an effective signaling tool. It allows countries to send a costly signal that their resolve to fight is not a bluff. Economic ties afford countries two different ways to make costly signals. First, a country can send costly signals through self-inflicting measures such as imposing economic sanctions against its counterpart. By causing damage to itself, the country can credibly communicate with its counterpart about its true intention. Second, costly signaling is also possible through a country's response to the economic costs imposed by the other.¹⁷⁾ By enduring economic costs, the message is credibly sent to the other that it is determined not to back down and is willing to escalate and use military force if necessary. This economic signaling logic can be more apparent in today's global economy because it may trigger a potential exodus of foreign investors and cause greater harm to national economies. By choosing a crisis to escalate and enduring a potential capital outflow, countries can signal their true intent and resolve more credibly to their economic partners.¹⁸⁾

Transformation of preferences and interests

The last mechanism focuses on the transformative effect of economic interdependence on the likelihood of war through changes in state preferences over conflict and cooperation. While the first two mechanisms assume that actors' preferences and interests are exogenous, this approach posits that they can change over time, affecting their behavior and outcome. It is a sociological process where the two countries have more contacts that are expanded on a larger scale to political, social, and cultural exchanges as economic ties become stronger. A sense of community can emerge as actors share values, norms, and symbols that provide a social identity. Security communities create the assurance that their differences will be resolved peacefully short of war. Mutual understanding and convergence of preferences and interests would make territorial conquest through a military force less of their national interests.¹⁹⁾

16) The information logic is similar to the constraint logic in a way that affects disputants' expected utilities of fighting, eventually facilitating a negotiated settlement. However, its mechanism is different. It focuses on how new information, especially during a military crisis, on military capability may change their chances of winning a war and, more importantly, their political resolve of fighting and not backing down. The constraint logic is based on ex-ante costs, which suggests that countries anticipate potential costs of economic disruption while signaling is possible through ex-post costs that have already been incurred.

17) Allan Dafoe and Nina Kelsey, "Observing the Capitalist Peace Examining Market-Mediated Signaling and Other Mechanisms," *Journal of Peace Research*, 2014, pp. 619-633.

18) Erik Gartzke, Quan Li, and Charles Boehmer, "Investing in the Peace: Economic Interdependence and International Conflict," *International Organization*, 2001, pp. 391-438.

The transformational process is also facilitated by economic ties that generate vested interests in both countries. Although most economic ties form in business communities due to their economic gains, there are other stakeholders including politicians, investors, consumers, journalists, scholars, and the public. With a higher level of interdependence, they are less inclined to have conflicting views with their foreign economic partners because an armed conflict would cause them political, economic, and social costs that they must pay. These actors would constitute a new domestic coalition and exert political pressure on the government to maintain stable and friendly relations with their trading partner countries. In support of this transformative logic, studies show that increased dependence on China leads to increased accommodation of Chinese interests in foreign policy or through voting in international institutions.²⁰⁾ Kleinberg and Fordham also find that members of the United States Congress were less supportive of measures hostile to China if their districts became more oriented toward Chinese exports.²¹⁾

The case of the Kaesong Industrial Complex

Deficient opportunity costs

The KIC certainly generated economic gains for South Korea. Since its establishment, the number of South Korean companies operating in the Complex grew from 18 in 2005 to 125 in 2015. The primary products manufactured in the Complex include textiles and clothing, chemical products, metals and machinery, electronics, and other kinds of products. According to South Korea's Ministry of Unification, the total production increased from USD 320 million in 2010 to USD 520 million in 2015. Using cheaper North Korean laborers South Korean companies were able to reduce production costs and increase their revenues. According to the International Crisis Group's analysis, these South Korean companies increased their revenues by 8%, fixed assets by 26%, and profit by 11% as compared to firms not operating in the Complex.²²⁾ Since its shutdown in 2016, the South Korean

19) Richard Rosecrance and Peter Thompson, "Trade, Foreign Investment, and Security," *Annual Review of Political Science*, 2003, pp. 377–398.

20) Gustavo Flores-Macías and Sarah Kreps, "The Foreign Policy Consequences of Trade: China's Commercial Relations with Africa and Latin America, 1992–2006," *Journal of Politics*, 2013, pp. 357–371; Scott Kastner, "Buying Influence? Assessing the Political Effects of China's International Trade," *Journal of Conflict Resolution*, 2016, pp. 980–1007.

21) Katja Kleinberg and Benjamin Fordham, "The Domestic Politics of Trade and Conflict," *International Studies Quarterly*, 2013, pp. 605–619.

22) International Crisis Group, "The Case for Kaesong: Fostering Korean Peace through Economic Ties," *Asia Report* N°300, 2019, available at <https://www.crisisgroup.org/asia/north-east-asia/korean-peninsula/300-case-kaesong-fostering-korean-peace-through-economic-ties> (accessed

government claimed that the cost of shutdown for the South Korean companies is estimated to be about USD 662 million.²³⁾

North Korea also benefited from economic cooperation at the KIC. The benefits include foreign investment in its infrastructure, employment for North Koreans, and hard currency that Pyongyang desperately needs. The KIC establishment came with upgraded transportation networks, infrastructure, and power facilities in the region. North Korean employees increased from 6,013 in 2005 to 54,763 in 2015. North Korea received workers' salaries in hard currency from South Korea. The North Korean government taxed workers' incomes at a high rate and redistributed the remainder to the workers in domestic currency or coupons. The total estimated wages of North Korean workers in the KIC were approximately USD 123 million in 2015.²⁴⁾

Despite the economic gains by both Koreas, the KIC project fell short of its initial aspirations in terms of size and quality. In its original blueprint, the third and final stage of the Complex would host 2,000 companies, employ 350,000 workers, and generate a value of USD 16 billion in its annual production.²⁵⁾ The unfortunate reality is that its first-stage development has never been completed. On the South Korean part, the Lee Myung-bak government ultimately abandoned plans to expand the KIC after North Korea conducted nuclear tests in 2006. The lack of investment and expansion led to the KIC accounting for only a fraction of 1% of South Korea's gross domestic product. For North Korea, the KIC similarly took up slightly over 1% of its foreign trade. Although the KIC contributed to its hard currency resources, other sources exceeded the value of payments from the KIC.²⁶⁾ As economic sanctions imposed by the United Nations Security Council and the U.S. continued, the Kim Jong-un regime became heavily dependent on China for its importation of

on August 15, 2021).

- 23) Sang-don Park, "Kaesonggongdan'giöp'yöp'oe "chöngbu, yudongjasan p'ihæaeng shinsok'i chiwönhaeya [Kaesong Industrial District Management Committee argues that the government must promptly assist current assets]," *Yonhap News*, December 14, 2021, available at <https://www.yna.co.kr/view/AKR20211214075900003>(accessed on December 15, 2021).
- 24) The South Korean government claimed that 30% is taxed and that the remaining 70% goes to workers in the form of essential foodstuffs and coupons for purchases. See more details. International Crisis Group, "The Case for Kaesong: Fostering Korean Peace through Economic Ties."
- 25) According to Park's 2004 study, the nine years old and fully developed KIC would have created added values of USD 24.4 billion and 100,000 jobs in South Korea while benefiting North Korea with USD 600 million in wages and corporate income tax with 725,000 jobs. Seoksam Park, "Kaesonggongdan chosöngüi kyöngjejöng hyogwabunsök [Analyzing Economic Effect of Kaesong Industrial Complex]," *Kümyunggyönggyeyön'gu [Monetary and Economic Research]*, 2004, pp. 1-52.
- 26) For instance, its income from coal exports to China would be ten times larger than USD 123 million. For more details, see the International Crisis Group's "The Case for Kaesong: Fostering Korean Peace through Economic Ties."

food, fabrics, petroleum, and electronics.

When it is compared to other cases where two disputant countries have economic relations, the magnitude and quality of inter-Korean economic cooperation are undisputedly insignificant or at best rudimentary. The value of cross-strait trade was USD 150.5 billion in 2018, which is a significant increase from USD 5.02 billion in 1998. Between 1991 and 2020, Taiwan's investment in China amounted to USD 188.5 billion.²⁷⁾ China and Japan, which have a territorial dispute over Senkaku / Diaoyu Islands, also have a high level of economic ties; they had about USD 300 billion in trade values in 2019, and Japan's foreign direct investment to China was approximately USD 11.3 billion in 2020. It is also worth noting that the inter-Korean economic ties at the KIC are isolated from the global economy, further depressing its opportunity costs, while economic ties across the Strait or in Sino-Japanese relations potentially generate greater costs because of their integration into the regional and global economies.

Overall, deficient economic cooperation in the Complex has not produced enough opportunity costs to constrain security behavior or policy on the Korean Peninsula.²⁸⁾ If one reviews inter-Korean relations over the past 20 years, a pacifying effect appears negligible. Low-intense military conflicts have not been deterred. In March 2010, a South Korean navy ship, Cheonan, was sunk with the loss of 46 lives near Baengnyeong Island, south of the de facto maritime border with North Korea in the Yellow Sea. The multinational investigation concluded that the ship was sunk by a North Korean torpedo fired from a submarine. Nine months later, in November 2010, North Korea shelled the island of Yeonpyeong in the disputed maritime border, killing two South Korean citizens and two marines.

Moreover, North Korea continued to develop its nuclear weapons program and missile capability while the KIC was established and operated. North Korea had six nuclear weapon tests in 2006, 2009, 2013, 2016, and 2017. Pyongyang claimed that the largest nuclear test in 2017 was its first thermonuclear weapon. North Korea is believed to possess 20 to 40 nuclear warheads and to have succeeded in miniaturization.²⁹⁾ The Kim regime has tested various ranges of missiles including intercontinental ballistic missiles, which can hit any city in the United States. It also developed a cyberwarfare capability over the past decade, disrupting government functions and causing financial losses to South Korea.³⁰⁾

27) Government of the Republic of China, available at https://www.taiwan.gov.tw/content_6.php (accessed on August 15, 2021).

28) Nearly 70 years of the absence of war on the Korean Peninsula can be credited to the deterrence provided by the U.S.-South Korea alliance system as well as North Korea's impoverished conditions caused by its international isolation, economic stagnation, and natural disasters.

29) Mary Beth Nikitin, "North Korea's Nuclear Weapons and Missile Programs," *Congressional Research Service In Focus* IF10472, 2021, available at <https://crsreports.congress.gov/product/pdf/IF/IF10472/21> (accessed on Dec 15, 2021).

30) U.S. Department of Defense, "Military and Security Developments Involving the Democratic

Not costly enough signaling

The KIC served as a signaling tool for both Koreas. North Korea used the stalled operation at the KIC to express its discontent with South Korean governments under President Lee Myung-bak and his successor Park Gun-hye, who were both hard-liners against Pyeongyang. In March 2008, North Korea forced eleven South Korean officials to leave the Inter-Korean Exchange and Cooperation Office in Kaesong. Nine months later, the regime further imposed limitations on the hours and number of South Koreans allowed to pass the border. The following year the North closed its border gate at Kaesong in response to the joint U.S. and South Korean military exercises, leaving hundreds of South Korean workers stranded in the city for days. In April 2013, the regime unilaterally shut down the KIC after the tension over the joint U.S. and South Korean military drills arose again.

The South Korean governments under the conservative presidents also utilized the KIC to send its northern neighbor a strong message about their stance and resolve. They explicitly showed that they would be willing to endure economic disruption and costs inflicted by the North. Sometimes they imposed costs on themselves to send a political message that they would not tolerate North Korea's provocations and accommodate its excessive demands. The South Korean governments, indeed, refused to accept North Korea's demand for wage and land lease increases in 2009 and 2015. After the sinking of the Cheonan naval vessel in May 2010, the Lee Myung-bak government imposed a ban on new investments in the KIC. It was also North Korea's fourth nuclear test and long-range rocket test in early 2016 that eventually motivated President Park Geun-hye to shut down the KIC and withdraw all South Korean nationals from the Complex. It was an eventual outcome of the tit-for-tat approach by the Lee and Park governments.

Although the KIC was the focal point for the two Koreas to express their discontent with each other and show their strong resolve, the tug of war over the KIC did not cause significant economic costs because of its deficient role in both Koreas' economies. Nor did the signaling through the KIC policies and operations yield any concession or compromise on security matters. Rather, the KIC was dependent on the inter-Korean relationship revolving around North Korea's increasing nuclear and missile capability. Mainly reflecting the inter-Korean security environment, the KIC served as a tool to punish its counterpart or further escalate political and security crises. In contrast to what the costly signaling mechanism expects, signaling through the KIC incrementally escalated the tension on the Korean Peninsula and fell short of bringing in policy concessions or behavioral accommodations. Moreover, the constant disruption of the KIC operation eventually led to lost opportunities for both

People's Republic of Korea," 2017, pp. 1-23, available at <https://media.defense.gov/2018/May/22/2001920587/-1/-1/1/REPORT-TO-CONGRESS-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-DEMOCRATIC-PEOPLES-REPUBLIC-OF-KOREA-2017.PDF>(accessed on June 10, 2021).

Koreas to develop the Complex into a full-fledged inter-Korean economic and liberal project as initially planned and expected in the early 2000s.

Stalled transformation of preferences and interests

The last causal mechanism suggests that the KIC can drive the two countries to change their preferences and interests, decreasing conflicting interests and increasing shared interests. Thanks to the development and operation of the KIC, a network of political parties, bureaucrats, businesses, scholars, research institutes, journalists, and civic groups in South Korea emerged. The Democratic Party of Korea, one of the major political parties, has been the key player who initiated and promoted the idea of economic engagement with North Korea. Another key player is the Corporate Association of Kaesong Industrial Complex housing about 120 South Korean companies. It was formed in 2006 to address issues relevant to the development and operation of the Complex while protecting its business interests and promoting public relations to support the KIC development. This association continuously expressed its concerns when there was a temporary disruption of the KIC operation. Since the complete shutdown in 2016, the group has continued to lobby the South Korean and U.S. governments for inter-Korean dialogue and the eventual reopening of the KIC.³¹⁾

Despite the creation of a domestic coalition in support of the KIC, there have been few transformative effects in South Korea. Above all, political changes in South Korea greatly rendered the development and operation of the KIC more uncertain and vulnerable to political and security issues. The Sunshine policy era presidents, Kim Dae-jung and Roh Moo-hyun, tried to separate economic cooperation from politics. They believed that the KIC must be a cornerstone for inter-Korean cooperation and eventually would bring about political reconciliation between the two Koreas. However, the successors, presidents Lee Myung-bak and Park Geun-hye, sought to link the KIC to security and political concerns over North Korea's growing nuclear and missile threats. They had a cynical outlook on KIC's potential and promise. Although the number of South Korean companies operating in the Complex increased since President Lee took office in 2008, he halted major plans to expand the KIC and took the reciprocity-based policy toward Pyeongyang. Likewise, a trust-building process on the Korean Peninsula suggested by President Park turned out to be the perpetuation of the hardline stance on Pyeongyang's provocation, which eventually led to a unilateral decision to shut down the KIC in 2016. The Park government further claimed that North Korea had not used USD 560 million in cash from the KIC to pave the way to peace but rather to upgrade its

31) Kyu-seok Shim, "Kaesong owners fly to Washington to lobby," *Korea JoongAng Daily*, June 10, 2019, available at <https://koreajoongangdaily.joins.com/news/article/article.aspx?aid=3064118>(accessed on August 15, 2021).

nuclear weapons and long-range missiles.³²⁾

Moreover, the KIC has not significantly improved South Korea's public support for inter-Korean economic cooperation. Although a majority of South Koreans said in 2019 that it is necessary to economically engage in North Korea for peace and prosperity, reopening the KIC, in particular, has been a more controversial topic.³³⁾ In 2020, 51% said that the KIC only should be conditionally reopened.³⁴⁾ Another survey similarly reports the bifurcation of public opinion with 43.6% in favor of the KIC resumption and 45.8% in opposition to it.³⁵⁾ With North Korea's ongoing security threats, denuclearization talks in stalemate, and experiences and challenges of developing and operating KIC, the public confidence in North Korea's commitment to peace has also declined over the two decades from 52.3% in 2000 to 32.9% in 2020.

There is a glimpse of the evidence that the KIC has provided North Korea with an opportunity to taste the principles and institutions of capitalist operation. The studies that interviewed South Korean workers in the Complex report on North Korean workers' behavioral and perspective changes at the KIC. Having experienced capitalism and adjusted to the new working environment, North Korean workers in the Complex recognized their self-interests and developed a new identity that made them desire to stay and work in the KIC.³⁶⁾ North Korean officials at the Complex

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- 32) Yoonjung Seo and Anna Fifield, "To punish Kim Jung Un, South Korea shuts down industrial zone in North," *The Washington Post*, February 10, 2016, available at https://www.washingtonpost.com/world/to-punish-kim-jong-un-south-korea-shuts-down-industrial-zone-in-north/2016/02/10/0237273a-79ba-420b-bcc6-5a749bd71bbf_story.html (accessed on August 15, 2021).
- 33) Seok-jong Lee, "kungmin 10myōng chung 6myōng t'ep'yōnghwawihae nambukkyōngghyōm p'iryot'e kidaegam [6 out of 10 South Koreans think that inter-Korean economic cooperation is required for peace]," *Asia Today*, January 1, 2019, available at <https://www.asiatoday.co.kr/view.php?key=20181230010018406> (accessed on August 15, 2021).
- 34) Korean Broadcasting System Inter-Korea Relation Department, "2020nyōn kungmin t'ongirūishing chosa [Survey of National Perception on Unification]" *Unification Broadcasting Review*, 2020, available at <https://office.kbs.co.kr/tongil/wp-content/uploads/sites/11/2020/11/%EC%9B%B9%EC%9A%A92020-%EA%B5%AD%EB%AF%BC-%ED%86%B5%EC%9D%BC%EC%9D%98%EC%8B%9D-%EC%A1%B0%EC%82%AC.pdf> (accessed on August 15, 2021).
- 35) Realmeter, "Sōnjejōng kaesōnggongdan chaegadong, och'abōmwi naero p'aengp'aenghage nat'ana [Poll on the preemptive reopening of the Kaesong Industrial Complex: neck and neck within the margin of error]," November 11, 2020, available at <http://www.realmeter.net/%EC%84%A0%EC%A0%9C%EC%A0%81-%EA%B0%9C%EC%84%B1%EA%B3%B5%EB%8B%A8-%EC%9E%AC%EA%B0%80%EB%8F%99-%EC%98%A4%EC%B0%A8%EB%B2%94%EC%9C%84-%EB%82%B4%EB%A1%9C-%ED%8C%BD%ED%8C%BD%ED%95%98%EA%B2%8C-%EB%82%98/?ckattempt=2> (accessed on August 15, 2021).
- 36) Eunmee Jeong, "Kaesōnggongdan puk'an küllōjaū chōngch'esōng inshikkwa haengdong yangshigūi mek'ōnijūm [Recognition of Identity and Mechanism of Behavior Pattern of North Korean Workers at the Kaesong Industrial Complex]," *North Korean Studies Review*, 2014, pp. 123-146; Yoo-yeon Kim, "Kaesōnggongdan kūnmu kyōnghōmjaga inshik'an puk'an küllōjaū t'üksōnggwa kŭe ttarūn kwan'gyehyōngsōng chōllyak [The Characteristics of North

also became interested in capitalist tax and accounting systems, learned merit-based incentives through productivity, and acquired know-how in running the industrial complex.³⁷⁾

At the national level, however, it is hard to tell that the KIC significantly contributed to changes in Pyeongyang's preferences and interests in favor of less confrontation and more cooperation with South Korea. Rather, North Korea's foreign policy and behavior largely reflected its power consolidation around the new leader, Kim Jong-un, over the past decade. His Byungjin (Parallel movement) policy in 2013, which pursued a simultaneous development of the military and economy, enhanced North Korea's nuclear capability and kept international economic sanctions in place. It depressed foreign investment and trade through special economic zones such as the KIC.³⁸⁾ An international hope for North Korea's market-friendly economic transformation was also dashed as the regime continued its ideological attachment to Juche (self-reliance) and Songun (military-first) embedded in North Korean politics. Its heavy reliance on China for foreign trade and economic cooperation under Kim Jong-un further rendered the inter-Korean economic projects around the KIC less influential and insufficient in transforming the regime's security and economic priorities. Although the North Korean leader expressed his desire to reopen the KIC in his 2019 New Year's address, the regime has not made any concessions that would partially lift economic sanctions by the United Nations Security Council.³⁹⁾

Conclusion

This study examines the opportunity cost, costly signaling, and transformation of interests and preferences to evaluate the link between inter-Korean economic ties and security on the Korean Peninsula. Using these frameworks, those who favor economic engagement can offer better accounts for the nexus between inter-Korean

Korean Workers Perceived by South Korean Workers at the Kaesong Industrial Complex and their Relationship Building Strategies],” *Unification and Peace*, 2020, pp. 183-228.

37) Grant Wyeth, “Time to Reopen the Kaesong Industrial Complex? A Conversation with Jin-hyang Kim,” *The Diplomat*, February 27, 2020, available at <https://thediplomat.com/2020/02/time-to-reopen-the-kaesong-industrial-complex-a-conversation-with-jin-hyang-kim/> (accessed on August 15, 2021).

38) North Korea announced in 2018 that it would end the Byungjin policy and prioritize economic development. It was two years after the KIC was shut down. It is reported that the regime wanted to boast itself as nuclear power and use it as a negotiation leverage if necessary.

39) Steve Miller, “Kim's New Year Address Signals He's Willing to Deal or Walk Away,” *Voice of America News*, January 2, 2019, available at <https://www.voanews.com/a/north-korea-leader-gives-2019-speech/4725381.html> (accessed on August 15, 2021).

economic ties and security. As the three processes do not necessarily occur all at once or proceed at the same pace, it would be beneficial for them to monitor which mechanism has been more salient and, accordingly, devise effective policies to reinforce the pacifying effect of economic cooperation. For the same reason, the causal mechanisms would allow the skeptics of the KIC or economic cooperation to engage liberals' peace projects by evaluating the current processes and engaging in discussion of the expected outcomes and prospects. Understanding the clear pathways would prevent a naïve hope and unfounded political claim against economic engagement from dominating the discourse on the peace process on the Korean Peninsula.

The past KIC experience suggests that reopening the KIC would not guarantee its positive influence on inter-Korean security. If one supports the resumption, s/he must consider improving its size and quality to increase the opportunity costs in the long run. It would include implementing the original plan for the second and third phase development of the KIC that would render the KIC three times larger in size and a more high-tech industrial complex. For the much longer term, it would need to implement a grand idea to integrate economic zones, such as former President Moon's proposal to connect the KIC to other cities on the west coast of South and North Korea through industry, logistics, and transportation. Greater opportunity costs would likely constrain the two Koreas' conflict behavior. Greater ex-post costs of economic sanction or disruption will also enable them to send a costly and credible signal during a crisis. More and more domestic players will be involved in economic cooperation, and more vested interests and favorable public opinion will be formed, inviting a higher level of cooperation in the realms of political, economic, and security policies. This should be the vision as well as the blueprint that those liberals must articulate.

Given the closure of the KIC and the stalemate in nuclear negotiations, it is easier said than done to resume and develop the KIC to generate greater opportunity costs. It is clearer than ever before that the KIC cannot be reopened without addressing the security environment on the Korean Peninsula, especially North Korea's nuclear weapons program. However, it is equally important to note that the first and most important condition should be to reach a domestic consensus in South Korea regarding the KIC and its role in the peace process. For this purpose, the KIC resumption should not be expected to be immediately effectual but be taken as part of the peace process. Only when the KIC is further developed into a larger economic cooperation project, its security effect would be significantly realized. It is also important to acknowledge that this security effect is a mid- and long-term process, not an outcome that can be observable in a short time frame.

To keep this liberal project, the South Korean government needs to address the claim that North Korea would use the revenue from the Complex to enhance its nuclear weapons and missile capability. Although it might involve a difficult

negotiation with Pyongyang, which does not want to lose control of its workers, the South Korean government should discuss with its counterpart alternatives such as direct payment to North Korean workers. It should also work closely with other countries, especially the United States, to calibrate the timing of easing international sanctions. As part of the peace process and in response to North Korea's denuclearization commitment, partially lifting economic sanctions would be viable, providing North Korea with breathing space for foreign investment and trade to restart and expand the KIC.

Furthermore, the South Korean government must improve the overall economic efficiency of the KIC. Since the economic gains from the KIC would be one of the few immediate effects of operating the Complex, economic incentives need to grow stronger. It will keep up the momentum until its security effect becomes apparent. The past KIC experience posed several operational and technical problems beyond political uncertainty. They include complicated passages and customs for South Korean workers, restrictions on their use of the internet and cellular phones, insufficient labor supply, and a lack of autonomy for the companies in managing North Korean workers.⁴⁰ Once both Koreas discuss the peace process involving the resumption of the KIC, there would be more room for them to negotiate and resolve these issues.

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40) Jongsu Kim, "Kaesŏnggongdan unyŏng p'yŏnggawa chaegaerŭl wihan kwaje [Evaluation of the Operation of Kaesong Industrial Complex and Challenges to Resume]," *Korean Journal of Area Studies*, 2021, pp. 193–220.

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3) Magazine or Newspaper articles

Oona A. Hathaway, "Why do Countries Commit to Human Rights Treaties?," *The Journal of Conflict Resolution*, August 2007, p. 588.

Lucy Hornby, "China moves further into Africa," *International Herald Tribune*, Jan. 9, 2012. p. A9.

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